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NEWLAND, ERIC, J., MAJ, MS

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BROOKE ARMY MEDICAL CENTER
3851 ROGER BROOKE DRIVE
FORT SAM HOUSTON, TEXAS 78234

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US Army Medical Department Center and School
BLDG 2841 MCCS-HFB (Army-Baylor Program in Health & Business Administration)
3151 Scott Road, Suite 1411
Fort Sam Houston, TX 78234-6135

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14. ABSTRACT

This study is a broad exploratory analysis of data collected on Wounded Warriors regulated from Operations Iraqi and Enduring Freedom for Fiscal Year (FY) 2006. Data were obtained from a database (n=86) of personal interviews conducted by Brooke Army Medical Center (BAMC) of Wounded Warriors receiving care at Walter Reed Army Medical Center (WRAMC) during a period of August through October of 2006 that possessed the potential to be further regulated to BAMC. In addition, data were extracted from the Amputee Care Program database (n=224) maintained jointly by the Amputee Care Center at WRAMC and the Amputee Care Center at BAMC. Further, background data demographics were taken from the Transportation Command (TRANSCOM) Regulating and Command & Control System (TRAC2ES) and Joint Patient Tracking Application (JPTA). The purpose of this research project was to examine some of the factors and demographics that affect the final Medical Treatment Facility (MTF) destination for Wounded Warriors evacuated from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom for Fiscal Year (FY) 2006. The Unit of Analysis (UoA) for this study is the individual Wounded Warrior as defined as a wounded servicemember or servicewoman who

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An exploratory analysis of factors surrounding Aeromedical Evacuation (patient movement) from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) focusing on placement of Wounded Warriors in US/CONUS-based Military Treatment Facilities (MTFs)

Graduate Management Project

MAJ Eric J. Newland

Army-Baylor University Graduate Program in Health and Business Administration

Preceptor: COL John Shero, Deputy Commander for Administration, Brooke Army Medical Center, Fort Sam Houston, Texas

Academic Advisor: LTC M. Nicholas Coppola, PhD, MHA, FACHE, Army Medical Department Center and School, Fort Sam Houston, Texas

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Disclosure Statement

The opinions or assertions expressed in this paper are those of the author and do not reflect the official policy or position of Baylor University, Brooke Army Medical Center, AMEDD Center and School, U.S. Army Medical Command, Army Surgeon General, Department of the Army, Department of Defense, or the United States Government.

Statement of Ethical Conduct in Research

Patient confidentiality was strictly adhered to during this research study. All patients' medical information was protected at all times, and under no circumstances will it be discussed with or released to any outside agency.

Absence of financial conflict of interest

The author declares no conflict of interest or financial interest in any product or service mentioned in this article, including grants, employment, stock holdings, gifts, or honoraria. The confidentiality of individual members of the study population was protected at all times throughout the study.

Study Limitations

The limitation of this study was the lack of a patient survey data to determine the historical events and processes that led to the final destination MTF of the individual patients. Conducting a comprehensive patient survey would indeed narrow and define these unknown factors not captured in this assessment.

Acknowledgements

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sense of humor. Secondly, I would like to thank the entire BAMC staff who helped with this project, namely, LTC Evan Renz from the Institute of Surgical Research and COL (Dr.) Rebecca Hooper (Ret), program director of the Amputee Care Center and The Center for the Intrepid for all their ideas, guidance and support in developing this project. Thirdly, I would like to thank LTC M. Nicholas Coppola, PhD., FACHE. Your continual encouragement, guidance, and help in developing this assessment have been immeasurable throughout the entire year of academics and now during this Graduate Management Project process. Finally, I want to thank my wife Tammy and our wonderful children. Erin, Eddie, Abby, and David I love you all very much and pray for the Lord's continued blessings.

Abstract

This study is a broad exploratory analysis of data collected on Wounded Warriors regulated from Operations Iraqi and Enduring Freedom for Fiscal Year (FY) 2006. Data were obtained from a database (n=86) of personal interviews conducted by Brooke Army Medical Center (BAMC) of Wounded Warriors receiving care at Walter Reed Army Medical Center (WRAMC) during a period of August through October of 2006 that possessed the potential to be further regulated to BAMC. In addition, data were extracted from the Amputee Care Program database (n=224) maintained jointly by the Amputee Care Center at WRAMC and the Amputee Care Center at BAMC. Further, background data demographics were taken from the Transportation Command (TRANSCOM) Regulating and Command & Control System (TRAC2ES) and Joint Patient Tracking Application (JPTA). The purpose of this research project was to examine some of the factors and demographics that affect the final Medical Treatment Facility (MTF) destination for Wounded Warriors evacuated from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom for Fiscal Year (FY) 2006. The Unit of Analysis (UoA) for this study is the individual Wounded Warrior or defined as a wounded servicemen or servicewoman who serves in the United States Army, Marines, Navy, Air Force, or Coast Guard. 38 of the 86 Wounded Warriors interviewed at WRAMC (44.19%) had a Duty Station (DS) within the Western Region (WR) of the Continental United States (CONUS). 64 (74.40%) had a current Home of Record (HOR) that also fell within the WR. With the increased pressure on the Military Health System, and WRAMC in particular, evidence suggests that larger numbers of Wounded Warriors require regulation to the MTF closest to their Duty Station or Home of Record earlier in the evacuation process. Identifying these Wounded Warriors and presenting their facility options earlier in the process will provide the environment that is best suited for the care, well-being, and rehabilitation needs of America's greatest treasure: Warrior in uniform.

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Introduction

Conditions which prompted the study

Wounded warriors from Operation Iraqi Freedom and Operation Enduring Freedom evacuated to Landstuhl Regional Medical Center (LRMC) in Landstuhl, Germany are further regulated, primarily to either Brooke Army Medical Center (BAMC) in San Antonio, Texas or to Walter Reed Army Medical Center (WRAMC) in Washington, D.C., with a few Navy patients regulated to Navy Medical Center San Diego (NMCSD), nicknamed *Balboa*, in San Diego, California. The intent of the Aeromedical evacuation process is to place the wounded warrior in the facility that best fits the medical requirement of wounds sustained along with other contextual factors that affect the needs and quality recovery of the wounded warrior.

Purpose

Despite written and unwritten guidance on Aeromedical evacuation, numerous patients regulated to WRAMC continue to remain at WRAMC, when conceptually, they should have been further regulated to BAMC and in some cases NMCSD. Because these decisions are often not centralized, this author is seeking to explore this issue in such a way that will assist all stakeholders in the process in making optimal decisions that involve medical necessity, patient desires, facility resources/services, family support, and outcome optimization.

The purpose of this research project was to examine some of the factors and demographics that potentially affect the final Medical Treatment Facility (MTF) destination for Wounded Warriors evacuated from Operation Iraqi Freedom and Operation Enduring Freedom for Fiscal Year (FY) 2006.

Intent of the Study

The intent of this paper is to conduct an exploratory study of U.S. wounded warriors in FY2006 using data collected from the U.S. Transportation Command's Regulating and Command and Control System (TRAC2ES), Joint Patient Tracking Application (JPTA), and Amputee Care Program database. Utilizing these three databases along with the documentation of Mr. Clyde Landry, case manager from BAMC, this paper seeks to explore how closely guidance in U.S. Army – OTSG/MEDCOM Policy Memo 06-022 (Patient Movement from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) to US/CONUS-based Military Treatment Facilities (MTFs)) is being executed.

Importance of the study and/or significance

The importance and significance of this study is centered on the care, well-being, and rehabilitation of the Wounded Warrior. The Wounded Warrior is the highest priority of the DoD Medical System at present. This is not to say or imply that Active Duty, Active Duty Family Members, National Guard, Reserve, Retirees, and other beneficiaries' care are any less important. However, due to ongoing missions in OEF/OIF, the Wounded Warrior who is making these sacrifices now is deserving of the best care possible and should remain the focus of the DoD medical system for the duration of the Global War on Terrorism (GWOT). Currently, the GWOT main effort is in OIF and OEF.

Problems

The difficulty with a thorough evaluation of these systems and processes is the size and scope of the evacuation system and the infinite number of factors that are

involved in the conduct of these operations. Individual leaders, managers, medical practitioners, and technicians are making numerous decisions all along the continuum of care. It is very difficult to understand how each individual decision is made within the context of numerous Standard Operating Procedures (SOPs), governmental directives, service specific policies, and regional & local guidance.

Research Question

How do the factors related to Aeromedical Evacuation (AE) from Operations Enduring and Iraqi Freedom present themselves during an exploratory analysis.

Unit of Analysis

The Unit of Analysis (UoA) of this study is the individual Wounded Warrior or defined as a wounded servicemen or servicewoman who serves in the United States Army, Marines, Navy, Air Force, or Coast Guard.

Background

To begin this process it is important to understand the process of evacuation and the context in which this system exists. The collection, evacuation, and treatment of the sick and wounded warriors on the battlefield are one of the primary missions for combatant commanders. The Soldiers, Marines, Sailors, and Airmen are the most precious assets in the Department of Defense and deserve the highest quality medical system dedicated to their care and survival. To accomplish this mission, it is the medical planner and policy maker's responsibility to plan, organize, coordinate, and resource ground and Aeromedical systems that bring the Wounded Warrior to the proper echelon of care medically required in a timely manner.

To frame this mission requirement, military planners at all levels identify and utilize five echelons of care (See Figure 1 below). Military personnel wounded on the

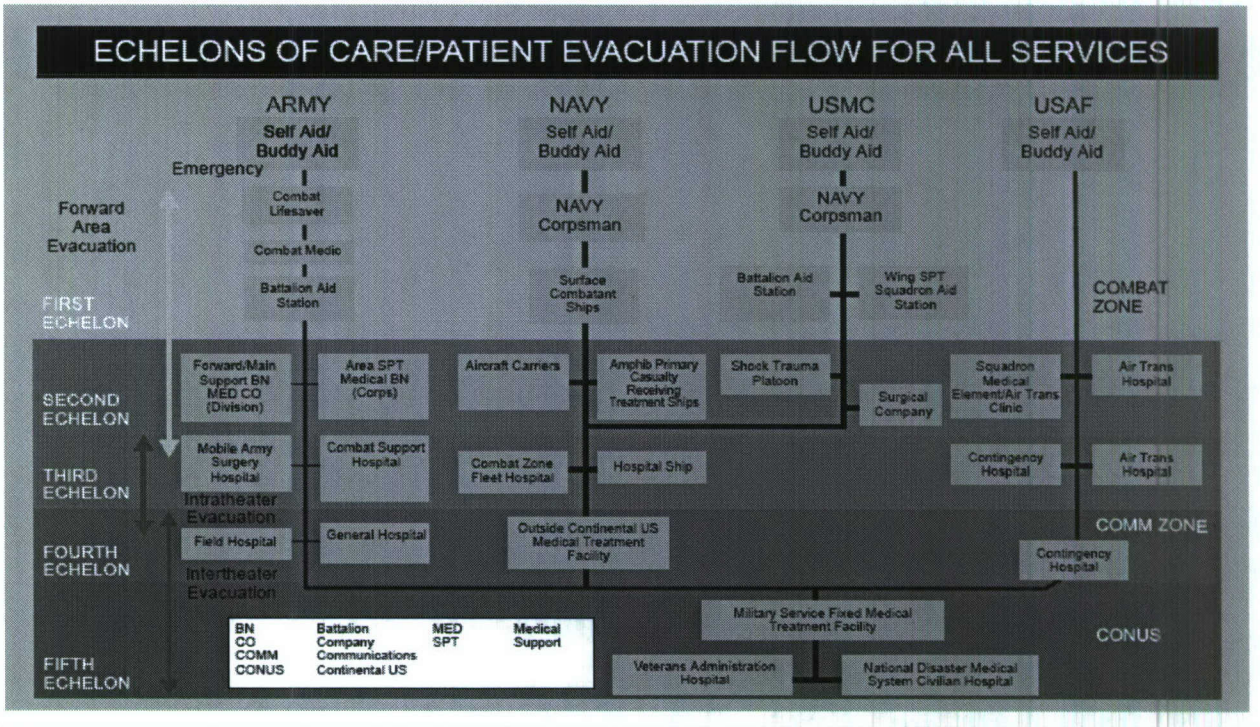

Figure 1. Echelons of Care/Patient Evacuation Flow for All Services (Source: Department of Defense (DoD) Joint Publication 4-02.2 Joint Tactics, Techniques and Procedures for Patient Movement in Joint Operations).

battlefields of Iraq and Afghanistan receive initial lifesaving care at what is called Echelon 1. The individual combat lifesaver along with the Army Medic, Navy Corpsman (Marines also), and Air Force medic provide initial first aid until they can be seen at a Battalion Aid Station (BAS) Echelon 1 facility. Here, the Wounded Warrior is further triaged and either returned to duty or sent on to an Echelon II care facility. In some of the Echelon II facilities in OIF/OEF the patient begins to receive an Electronic Medical Record (EMR) being produced by the Battlefield Medical Information system Tactical-Joint (BMIST-J). This hand-held device allows information to be electronically recorded and sent to higher echelon MTFs. In OIF and OEF, currently, Echelon III MTFs (i.e. Combat Support Hospital (CSH)) predominately are the first point at which the patient gets entered into the U.S. Transportation

Command Regulating and Command and Control System (TRAC2ES) through the generation of a Patient Movement Request (PMR). The Wounded Warrior, after stabilization of wounds, is prepared for the next major move out of theater to Echelon IV. In the case of OIF/OEF this level of care is provided by Landstuhl Regional Medical Center (LRMC) in Landstuhl, Germany. For critically wounded personnel, they will be further stabilized at an Echelon IV facility and prepared for movement on to Echelon V care at a Medical Treatment Facility (MTF) classified as a Medical Center back in the Continental United States (CONUS). For the purposes of this study, these medical centers are WRAMC and BAMC. This movement of Wounded Warriors globally is carried out by the DoD Aeromedical Evacuation (AE) system. The primary mission of the DoD AE system is to safely transport:

> U.S. military casualties from a combat zone to fixed medical treatment facilities and field hospitals in or out of the combat theater. Patients not expected to return to duty within the number of days established in the combat theater evacuation policy will normally be evacuated to the next medical operational zone as soon as medical authorities have determined that travel will not aggravate their medical condition. Other patients may be moved on a non-interference basis if the patient's medical condition, lack of local care, and costs warrant the move. (DoD Inspector General, 2005).

To accomplish this, the planner must utilize the six health care principles of: Conformity (integration and compliance with the commander's plan), Proximity (providing HSS as close to combat operations as the tactical situation permits), Flexibility (shifting HSS resources to meet changing requirements), Mobility (anticipate requirements for rapid movement of HSS units to support combat forces during

operations), Continuity (providing optimum, uninterrupted care and treatment to the wounded, injured, and sick) and Coordination (ensuring that HSS resources in short supply are efficiently employed and used to effectively support the planned operation) (Joint Publication 4-02, 1995).

Current "trends in warfighting doctrine have continued along the lines of emphasizing lighter, faster, and forward extended operations requiring a parallel in transformation for medical services" (Bouma, M.F., 2005). To accomplish quality planning and follow-on patient care, the Aeromedical Evacuation (AE) system should incorporate innovative, comprehensive, integrated, and redundant policies that contain information technology systems (i.e. TRAC2ES, Joint Patient Tracking Application (JPTA), etc.) to support developed doctrinal casualty regulating. Since the attacks on the United States by Muslim extremists on September 11, 2001, two main conflicts have produced large numbers of these high acuity patients. These are primarily burn, limb amputation, and limb salvage patients. With the rise of ever more devastating and destructive weapons, the warriors on the battlefield are subjected to ever increasing acuity of wounds suffered during these conflicts. These categories of patients have put the DoD medical system to the test. The complexity of wounds suffered as a result of the Improvised Explosive Device (IED) and Vehicle-Borne Improvised Explosive Device (VBIED) have produced an increased need for seamless patient flow out of theater and well developed plans to regulate patients to the proper facility within the Continental United States (CONUS).

The evacuation system has done an immense job of transporting these Wounded Warriors from the battlefield to CONUS. However, there are still problems that arise in

the proper regulation of patients to the Medical Treatment Facility that can best meet the needs for Wounded Warrior's care and recovery.

Walter Reed Army Medical Center and Brooke Army Medical Center are the two primary specialized medical referral centers in the United States Military Healthcare System (MHS) that provide care to Wounded Warriors returning to CONUS. Both of these hospitals play a crucial role in the delivery of medical care to Wounded Warriors returning from OIF/OEF. Based on numbers recorded in the Joint Patient Tracking Application (JPTA) database for fiscal year (FY) 2006 (October 1st, 2005 to September 30th, 2006), both medical centers received a combined total of 1,326 Wounded Warriors that required intensive burn, amputee, and orthopedic care for wounds sustained in these ongoing conflicts as part of the GWOT.

Assumptions

This study was based on many assumptions. First, Wounded Warriors were not interviewed by this author. A portion of this study includes responses given to Mr. Clyde Landry, Case Manager, Brooke Army Medical Center, which were annotated at the time of questioning and were done in a semi-formal manner. The responses gleaned from these interviews represent the feelings, opinions, and decisions of Wounded Warriors at the time of questioning while they were either an inpatient or outpatient at Walter Reed Army Medical Center. This being said, responses prior to, immediately after, or since then may have changed for an infinite amount of reasons. Therefore, this study bases some of its conclusions on information that was available from the period of August through October of 2006, and may not represent decisions made since then or decisions of the wider Wounded Warrior population.

The second main source of data utilized was that of the Amputee Care Program database maintained by Mr. Chuck Scoville, Program Manager, Walter Reed Army Medical Center and secondarily by Dr. Rebecca Hooper, Program Manager, Amputee Care Program at Brooke Army Medical Center. This data is entered into the database by several personnel, and data entry accuracy and validity might have suffered as a result. However, for the purposes of this study, this data gives a snapshot of FY2006 and meets the minimum requirements of an exploratory study.

Literature Review

Review of the History of Casualty and Medical Evacuation

Evacuation of Wounded Warriors from the battlefield is based on systems of policy, medical technology, current evacuation platforms, and numerous individual decision factors. To understand the current policies, methods, and technologies of patient movement, historical development of patient evacuation from numerous American wars needs to be understood. The following review highlights some of America's major wars and does not include smaller operations, such as Operation Urgent Fury in the country of Grenada, Operation Just Cause in the country of Panama, or the larger operations conducted in the Balkans in the late 1990s.

Patient movement, as a recorded and formalized system, really began circa 1792 during the Napoleonic Wars. Dominique Jean Larrey, a French surgeon, began to develop one of the first truly organized and structured evacuation systems that focused on ensuring a more rapid and efficient evacuation of the sick and wounded on the battlefield. His system sought to reduce the time required to evacuate the patient off the battlefield and provide care to these 'Wounded Warriors' as far forward on the battlefield as safely

possible. This system served as the basis for the system that Union Surgeon, Major Jonathan Letterman, would use later during the American Civil War (MacDonald, 2004).

The American Civil War was the first American conflict that saw large numbers of wounded on the battlefield. Based on a study done by Hannah Fischer for the Congressional Research Service (See Table 1 below), there were 281,881 casualties listed

Table 1. American War and Military Operations Casualties: Lists and Statistcs.

	Number Serving	Wounds not Mortal	Battle Deaths	Other Deaths	Total Deaths
American Civil War	2,213,363	281,881	140,414	224,097	364,511
Spanish American	306,760	1,662	385	2,061	2,446
World War I	4,734,991	204,002	53,402	63,114	116,516
World War II	16,112,566	671,846	291,557	113,892	405,399
Korean War	5,720,000	103,284	33,741	2,833	36,574
Viet Nam War	8,744,000	153,303	47,424	10,785	58,209
Persian Gulf War	2,225,000	467	147	235	382

Note. This data is adapted from American War and Military Operations Casualties: Lists and Statistics by Hannah Fischer in the CRS Report for Congress updated July 13, 2005.

as "Wounds Not Mortal" sustained between 1861 and 1865. In addition to the wounded, there were an estimated 140,414 Union Army battle deaths and 224, 097 other deaths for a total of 364,511 deaths associated with the Union Army. These numbers, however, do not reflect the wounded and dead of the Confederate Army. In her paper, 'American War and Military Operations Casualties: Lists and Statistics' dated July 13, 2005; Hannah Fischer stated:

> Authoritative statistics for the Confederate forces are not available … The final report of the Provost Marshal General, 1863-1866, indicated 133,821 Confederate deaths (74,524 battle and 59,297 other) based upon incomplete returns. In addition, an estimated 26,000 to 31,000 Confederate personnel died in Union prisons (Fischer, 2005).

Because of these incomplete records, there is no formal estimate of 'Wounds not Mortal' or commonly referred to today as Wounded in Action (WIA) for this large-scale conflict. It is highly probable that these numbers are somewhere in the range of what the Union Army experienced.

These numbers forced leaders and planners at all levels to develop new systems and methods to evacuate large number of casualties. One of the major developments in the Civil War to accomplish evacuating these large numbers was the horse drawn ambulance developed by then Major Jonathan Letterman. This ambulance system referred to as the "Letterman Ambulance Plan" was officially implemented in 1862 "when McClellan issued General Orders No. 147 creating the Ambulance Corps for the Army of the Potomac under the control of the Medical Director" (Davis, 1983). This organized and resourced ambulance system was able to more effectively move patients from the Front Line of Troops (FLOT) to the field hospital with greater efficiency, thereby saving an undetermined number of lives. The use of the word *undetermined* is utilized here, because there are no definitive statistics to demonstrate this, other than historical claims mentioned above.

Ironically, despite this notable development, the American Congress would not officially develop an ambulance corps for the entire Union Army until early 1864 when the act "Public 22" was created. One year later at the completion of the Civil War the Ambulance Corps, sadly, would be disbanded. However, the importance of this development is still observable today, where organized ambulance movement of patients is still saving lives of Wounded Warriors at all echelons of care on the battlefield (MacDonald, 2004).

Thirty years after the American Civil War, the Spanish American War began. Between the period of May to August of 1898 (Fischer, 2005) there were a reported 385 battle deaths, 2061 other deaths, and 1,662 "Wounds Not Mortal" that resulted from this conflict.

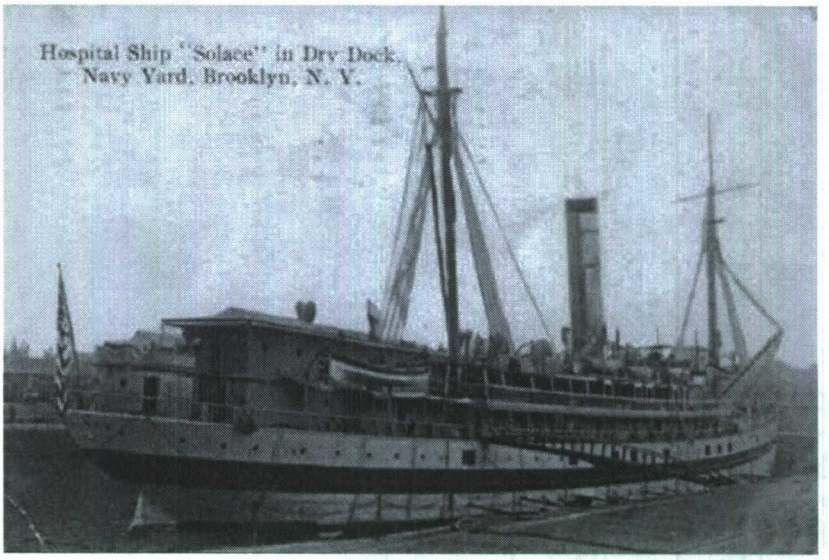

Figure 2. The Hospital Ship *Solace in Dry Dock, Navy Yard, Brooklyn, New York circa 1915. Source: The Spanish American War Centennial Website found on 23 Janaury 2007 at: http://www.spanamwar.com/solace.htm*

This war, while not the size of conflict (in numbers and length of time) of the American Civil War, took place over vast geographical distances; including the Philippines, Guam, Hawaii, Puerto Rico, and largely in Cuba.

Because of these vast distances, it is probable that the major evacuation development during this conflict was the first use of a dedicated ambulance ship for U.S. forces. The U.S. Navy ship *Solace* (See Figure 2 above) was the first dedicated ship to evacuate casualties. According to McSherry (2006) the Solace was,

> originally constructed in 1896 as the Creole for the Cromwell Steamship Lines … and acquired on April 7, 1898 by the U.S. Navy … and fitted out as an 'ambulance

ship', complete with a large operating room, steam disinfecting apparatus, ice machine, steam laundry plant, cold storage rooms, and an elevator. She [USS Solace] could accommodate two hundred patients in her berths, swinging cots and staterooms. Her hurricane deck was enclosed with canvas to be used as a contagious disease ward. She was given gifts of supplies and equipment from groups such as the Rhode Island Sanitary and Relief Association and the National Society of Colonial Dames, gaining an X-ray machine, a carbonating machine, etc. Solace's crew included a surgeon; three assistant surgeons, three hospital stewards (one of which was a skilled embalmer), eight trained nurses, a cook, four messmen and two laundrymen. The ship and her crew had 'the honor of inaugurating antiseptic surgery at sea.' Her first trip took her out to the Cuban and Puerto Rican blockading squadrons where she collected the few men wounded in the bombardment of San Juan, and other sick or wounded among the fleet. On June 5, she arrived in New York with 57 sick and wounded men. She returned to the vicinity of Cuba in time to take aboard the Marines wounded in the capture of Guantanamo, and then Army Spanish wounded who had been taken aboard the Brooklyn after the Spanish loss in the naval Battle of Santiago. She also took aboard an additional 44 Army personnel, 48 wounded Spanish navymen and an additional 55 sick navymen at Hampton Roads, Virginia. After being resupplied and outfitted with an additional ice machine in New York, she again steamed south to the war zone. She picked up the Navy sick from the waters around Cuba and those injured and wounded brought by the Gloucester from Puerto Rico.

After transporting these men to Boston, she underwent some repairs and then went

> back to Cuban waters. By now it was September and the fighting was over, but the need for Solace was greater than ever. With the outbreak of yellow fever and malaria among the troops in Cuba, the situation was quite grave. Solace was under orders bringing home as many of the sick as she could accommodate (McSherry, 2006).

This development of an integrated ambulance and hospital was not only instrumental in the later development of dedicated hospital ships within the United States Navy, but served as a basis for the later concept of dedicated and non-dedicated aircraft in the United States Air Force that provide enroute care evacuating our Wounded Warriors from the battlefields of OIF/OEF utilizing the AE system today.

Less than twenty years later, America entered into World War I in 1917 with the April 6th declaration of war with Germany by President Woodrow Wilson. This 'War to End All Wars' resulted in 53,402 battle deaths, 63,114 other deaths, and 204,002 "Wounds Not Mortal" (Fischer, 2005). Despite these numbers of dead and wounded, and the increased lethality of indirect fire weapons and mass casualty gas weapons, "battlefield deaths dropped to nearly half (8 per 100) of those seen in the civil war" (Thomas, 2006).

This reduction in lives lost and decreased number of wounded are largely due to America entering the war three years late. Therefore, they had the benefit of having a system of evacuation currently practiced by the French and British. Again, these processes were based on the Larrey and Letterman systems.

In addition to these systems, was the technological development of, "Motorized ambulances, locomotives" and for the first time, "aircraft [that] evacuated the sick and

wounded. These evacuation platforms coupled with American and French coalition operations, decreased evacuation times and improved the echelon of care system" (Thomas, 2006).

World War I further developed the echelons of care approach by moving hospitals and other medical care packages even closer to the front lines. Because World War I was a war 'in the trenches', care for the wounded had to be pushed farther forward to accommodate the large density of troops in geographically smaller areas. "This prompted surgeons to call for a decrease in the time between wounding and surgical intervention. Positioning surgical units closer to the front, more lives could be saved" (Thomas, 2006). This system for far forward care would be the early genesis for development of the Forward Surgical Team (FST) that would be adopted in the United States Army shortly after Operations Desert Shield and Desert Storm (Thomas, 2006).

These lessons, and many others from World War I, were instrumental in helping planners get a good start on developing a system quickly in the next war, World War II. World War II would utilize these systems and project them onto a global scale to save the lives of millions that would fight around the globe.

With the declaration of war in December of 1941, the United States became involved in the largest War in American History, with an estimated 16 million uniformed Soldiers taking part. World War II saw the death of 405,399 military personnel and another 671,846 wounded (Fischer, 2005). For the United States and her allies, the sheer size and scope of this conflict would require more comprehensive plans and resources to move Wounded Warriors off the battlefield.

Improving upon the lessons of World War I, military medical planners "effectively planned and executed a global patient movement system" (MacDonald, 2004) during this war. One of the major developments in evacuation from this war was the habitual use of fixed-wing aircraft to move wounded from the battlefield to hospitals, both in theater and out of theater, rapidly. "These innovations and the cooperation of joint and coalition partners further decreased evacuation times and ensured patient accessibility to the full continuum of medical care" (MacDonald, 2004).

World War II also saw the first use of plasma and whole blood products that helped increase the survivability of the wounded warrior. In addition to blood products, the wide spread use of antibiotics, improvements in surgery methods, and large scale emphasis on preventive medicine techniques helped to decrease the Died of Wounds (DOW) rate from "eight percent (in World War I) to approximately 3.5 percent" (MacDonald, 2004).

Each of these developments was instrumental in today's evacuation of Wounded Warriors from the battlefield. The large use of fixed wing aircraft in World War II serves as the basis for the modern Aeromedical Evacuation system being primarily practiced by the United States Air Force today.

Only 5 years after the end of World War II came American involvement in war on the Korean peninsula. During the period of 1950-1953, the United States had recorded 5,720,000 personnel serving in uniform. Casualties sustained during the Korean War included 33,741 battle deaths, 2,833 other deaths not directly related to combat, and 103,284 personnel listed as "Wounds Not Mortal" (Fischer, 2005).

While the system of evacuation, for the most part, remained consistent with previous wars, the major development that helped save lives of wounded warriors on the battlefield was the helicopter. "The helicopter played a prominent role by moving close to 17,700 patients. Although patient movement by helicopter was in its infancy and had considerable operational issues, it was soon to become the preferred method for evacuating casualties from the battlefield in future conflicts" (MacDonald, 2004). This development, once again, serves as the basis for today's modern Medical Evacuation (MEDEVAC) system within theater. The helicopter in OIF and OEF is the mainstay for moving patients from the point of injury to definitive hospitalization whereby the patient is further prepared to enter the AE system for movement to CONUS.

Less than 10 years later, the United States was involved in Southeast Asia, namely the country of Vietnam. During the years of 1964 to 1973 there were an estimated 8,744,000 million personnel serving on active duty and the reserves. Vietnam casualties resulted in an estimated 58,209 deaths, of which 47,424 were listed as battle deaths and another 10,785 non-battle deaths. An estimated 153,303 casualties are listed as Wounds Not Mortal (CRS, 2005).

From the beginning of the Vietnam War, the medical and casualty evacuation system continued to improve upon methods developed in previous wars. With its beginning, as discussed earlier, in the Korean War, helicopter evacuation became the single most important aspect of saving lives. The helicopter ambulance was critical in decreasing evacuation times from 4-6 hours, as was customary in Korea to a mere 35 minutes in Vietnam. This improvement set up a system that resulted in an estimated 97.5 percent survival rate for wounded on the battlefield being successfully evacuated to field

hospitals in country. The magnitude of this system was demonstrated by an estimated 850,000 to 900,000 US, civilian, joint, and coalition casualties in Vietnam being evacuated (MacDonald, 2004).

Operations Desert Shield and Desert Storm conducted from August 7, 1990 to September 14, 1991 resulted in 382 combat deaths and another 467 classified "wounds not mortal" (Fischer, 2005). Operations Desert Shield and Desert Storm took place only a year after the invasion of Panama and was America's first large scale deployment of troops since the Vietnam War. In his Strategy Research Project for the Army War College in 2006, Army Colonel Richard Thomas comments on how:

> "The medical force deployed in Operation Desert Storm had been designed to fight in a massive land war against the Soviets in Europe. Hospital units, including the Mobile Army Surgical Hospitals (MASH) required excessive strategic lift to get them to the battlefield and were too large and immobile to move with maneuverable combat forces. The Medical Department recognized the need for lighter, flexible, yet capable, units to reduce the medical footprint in a given theater of operations" (Thomas, 2006).

To reduce the medical footprint, after the Persian Gulf War, the Army developed the concept of the Forward Surgical Team (FST). This team was developed to "address this specific window of treatment time for severely wounded soldiers" (Thomas, 2006). The FST is widely credited with lowering mortality rates for Wounded Warriors on the battlefield and has become a very important asset on the battlefields in Afghanistan and Iraq today.

Utilizing the lessons learned and information system developments during the Persian Gulf War, the United States military was fully prepared to plan, resource, and execute a fully integrated medical plan for today's major conflicts in Operations Enduring and Iraqi Freedom. On October 7th of 2001, the United States began what would be named Operation Enduring Freedom in Afghanistan, the beginning of the Global War on Terrorism. A year and a half later the United States would begin Operation Iraqi Freedom in Iraq. These two operations have resulted (as of March 24, 2007) in a total of 25,455 Wounded in Action (WIA).

Operation Enduring Freedom and later Operation Iraqi Freedom would see military medical planners fully prepared for evacuating casualties out of theater and back to CONUS within days of wounding. The Larry and Letterman evacuation strategies coupled with modern Aeromedical Evacuation (AE) assets and information technologies set the stage for the modern medical evacuation system of today. Part of this modern evacuation system was the widespread use of the FST.

The FST has been a key asset ensuring that Wounded Warriors receive lifesaving treatment required to stabilize the Wounded Warrior before they enter the Aeromedical Evacuation system. Thomas (2006) relates how:

> "OIF represents the first, large scale utilization of FSTs in the Army's history. Creation of these specialized units represents an incredible evolution for combat casualty care; the ability to provide emergency surgery on the battlefield. The AMEDD has been very successful in "selling" this far-forward surgical concept to the combatant commanders. The FST requires support from the unit to which the team is attached, and these factors must be considered during planning. Indeed,

the modern war fighter has grown to expect this surgical capability to be present throughout combat operations" (Thomas, 2006).

The FST, along with the modern Combat Support Hospital, allow Wounded Warriors to enter a system of lifesaving care that will take them from these battles to a modern medical center in the United States. Successes in Operation Enduring Freedom in Afghanistan and now Operation Iraqi Freedom have utilized these proven concepts. As of 28 February 2007 TRAC2ES records 4,087 patients moved from the United States Central Command (CENTCOM) Area of Responsibility (AOR) to the United States European Command (EUCOM), another 600 patients moved from CENTCOM directly to CONUS, and finally 3,240 patients moved either primarily or follow-on from EUCOM to CONUS (TRAC2ES System Statistical Summary, 2007).

The successes of patient movement have many factors beyond simply the traditional evacuation planning strategies and information systems. The United States Transportation Command (TRANSCOM) located at Scott Air Force Base, Illinois has the sole responsibility for administering this system. The specific division with this responsibility is the Global Patient Movement Requirements Center (GPMRC) which focuses its efforts solely on patient movement.

Review of Evacuation Command and Control Nodes

The primary organization responsible for the evacuation of Wounded Warriors is the United States Transportation Command (USTRANSCOM). USTRANSCOM accomplishes this specific medical coordination mission utilizing the Global Patient Movement Requirements Center. GPMRC "integrates inter-theater and CONUS medical

regulation services, mission requirements, clinical validation, and related activities that support patient movement requests (PMR)" (DoD Inspector General Report, 2005).

GPMRC coordinates with other TRANSCOM staff for multiple modes of transportation platforms that are available at any given time. Modes of transportation may include traditional air, sea, and ground transportation assets. The major focus of the GPMRC staff, however, is the medical priority of the patient, any special equipment required, and the final destination of not only individual wounded warriors, or groups of warriors that may be coming from or regulated to specific CONUS locations.

GPMRC, due to the complexity of mission requirements, serves as the single manager responsible for around the clock operational planning, decision making, command, control, policy, validation, and coordination for all requested AE missions. Further, the GPMRC "coordinates with supporting resource providers to identify, but not task, available assets and communicate lift-bed plans to patient movement providers" (GPMRC Handbook, 2001). However, GPMRC does have the sole responsibility of developing, establishing, and maintaining wounded warrior accountability and visibility throughout the transport back to CONUS. This responsibility is no small task and because of the increasing complexity of accountability, relies very heavily on subordinate theater and joint movement centers located around the globe in multiple Combatant Command areas of responsibility (AOR) (GPMRC Handbook, 2001).

Finally, GPMRC is also responsible for collecting data on all performed missions for use in determining future requirements and retrospectively comparing past forecasts with true operational tempo (OPTEMPO). This data allows both GPMRC and other DoD

agencies involved to share data for related studies. It should be noted that this data is tracked and utilized by the TRAC2ES system which will be covered later in this paper.

The Theater Patient Movement Requirements Center (TPMRC) is only an extension of the GPMRC. These centers serve as a theater commander's asset to coordinate patient movement within the theater. A local TPMRC under the Unified Commander's control becomes the single decision authority for intra-theater patient movement development, planning, coordination, and execution within the geographic or supported AOR (GPMRC Handbook, 2001). This local center has the primary responsibility of executing local operational policy, while maintaining direct contact with GPMRC back in CONUS and any Joint Patient Movement Requirements Center (JPMRC)

In addition to the TPMRC, USTRANSCOM also has the capability of establishing a Joint Patient Movement Requirements Center (JPMRC). The JPMRC serves a deployable movement center delegated for specific decision authority within a Joint Task Force (JTF) Commander's Area of Responsibility (AOR). This center, also utilizing and supported by the TRAC2ES, becomes the governing evacuation control node accomplishing mission policy within the guidelines of the JTF Commander's local evacuation policy.

Much like its parent organizations, the JPMRC is "responsible for JTF-wide patient movement management and coordination … and is responsible for maintaining patient In-Transit Visibility (ITV)" (GPMRC Handbook, 2001). JPMRC does this by collaborating with JTF air coordination centers, transportation centers, and intra-theater medical evacuation assets. JPMRC also continues the share the responsibility with other

control centers for lift-bed planning and other patient movement solutions (GPMRC Handbook, 2001).

Review of evacuation information systems

To support the evacuation system, numerous automation systems have been developed over time to provide In-Transit Visibility (ITV) (See Appendix G) of patients being flown around the world. The primary system that is the benchmark for these operations is the TRANSCOM Regulating and Command & Control System referred simply as TRAC2ES.

> The TRAC2ES mission is to combine transportation, logistics, and clinical decision support elements into a seamless patient movement information management system which is capable of visualizing, assessing, and prioritizing patient movement requirements, assigning proper resources, and distributing relevant data to efficiently deliver patients. The vision is to manage patient movement with totally visibility and worldwide responsiveness. A fully adopted TRAC2ES Enterprise promotes effective use of personnel and resources with efficient use of bed and lift capabilities. Implementation of the TRAC2ES Enterprise vision significantly enhances the daily operations database supporting global patient movement. (TRAC2ES Handbook, 2005).

With this information accessible, the management of each successive patient movement benefits from the collective experience and accumulated information from all past movements. Moreover, TRAC2ES provides the ability to research past itineraries, costs, and other related information to assist in business-case analysis. The ability of TRAC2ES to perform what-if analysis and conduct assured reactive re-planning pays

dividends well beyond its primary mission of ensuring each patient is moved expeditiously and cost effectively to a definitive care destination. (TRAC2ES Handbook, 2005).

The TRAC2ES operational concept provides a seamless enterprise, used the same way in peace and war, that links originating and destination Medical Treatment Facilities with Patient Movement conveyances and C2 infrastructure necessary to maintain continuous situational (global) awareness of the global patient movement system. TRAC2ES will provide global support throughout the full operational medical continuum. The operational concept is based on the establishment (or deployment) of PMRCs in the Continental United States and operational theaters and at the Joint Task Force (JTF) level. (TRAC2ES Handbook, 2005).

The Joint Patient Tracking Application is designed for MTFs to access information on Wounded Warriors originating from OEF/OIF being transported in the Aeromedical Evacuation system. This system allows medical regulators and managers to "collect, manage, analyze, and report data generated by, and related to, patients arriving from OEF/OIF." (Rapp, 2005 Information Paper dated 10 February 2005).

JPTA's capabilities are as follows:

JPTA is a web based application that leverages several authoritative data sources (CHCS, Total Army Personnel Data Base (TAPDB), Air Force Personnel System (MILPDS), the USMC Personnel File, DEERS and TRANSCOM Regulating and Command and Control Evacuation System (TRAC2ES)). Patient tracking currently begins with the Patient Movement Request (PMR) being entered into TRAC2ES at an echelon 3 facility in theater. JPTA is capable of providing a

> number of daily patient reports that include: diagnosis, type of injuries (BI / DNBI), length of stay, number and type of patient and pending departures. Capability now exists to facilitate drilling down from theater level to Service (Army USAF, Navy, Marine, Coalition Military (by Country), DoD civilians, and contractors. Military patients can be sorted by Division (or EAD units), then from Brigade level down to the individual soldier where current status and treatment history for care received at LRMC are available to authorized users. JPTA also includes an electronic Aeromedical Evacuation Patient Record/Request Form (AF Form 3899) that is automatically populated using existing data; this has improved accuracy, efficiency and legibility of the information required to request patient movement. (Rapp, 2005).

The Joint Patient Tracking Application is a "computerized tool that allows users to get real-time information about the status of injured troops as they make their way through the medical system." (Basu, 2005). The system possesses the following tools to provide that status: Patient Registration, Search, Information, Reports, Service Specific looks, and other useful information. Under the Patient registration, the user can either add a new patient registration or update a current patient in the system. Searches for patients only require a last name or social security number. The patient information menu provides the user with the ability to look up vital patient information or treatment management options. The user also has the ability to obtain multiple pre-formatted reports from the system. These reports include: Active Patient Reports, Daily Reports, Liaison Reports, Originating Location reports, GWOT specific Patient Transportation Reports, Air Transport Reports, Graphical Reports, Aeromedical Evacuation Reports,

Historical Reports, Task Force Specific Reports, Joint Trauma Registry Reports and finally Blood Transfusion Reports. The user also has the ability to search by Service, both current and new patients.

Review of Evacuation Specialty Teams

To enhance the care of Wounded Warriors being transported from OEF/OIF, the Air Force utilizes the Critical Care Air Transport Team (CCATT). With the complexity of wounds, especially burn and amputee patients, evacuation can be a very difficult process. However, the CCATT team is "a unique, highly specialized medical asset that can create and operate a portable intensive care unit (ICU) on board any available transport aircraft during flight. It is a limited, rapidly deployable resource and a primary component of the Air Force's Aeromedical Evacuation (AE) System" (Air Force Surgeon General, 2005).

This team consists of three people specializing in critical care medical specialties, with experience in such areas as pulmonology, surgery, burn care, and other critical care specialties. Prior to operations in OEF/OIF, patients were kept in Landstuhl Regional Medical Center (LRMC) in Landstuhl, Germany. Patients are now being transported in more of a state of 'stabilization' rather than 'stable' as they were before. "The single, key element in the success of this shift in our concept of operations is the capability of the Critical Care Air Transport Team" (Air Force Surgeon General, 2005). Because of this concept development, today in the AE system there are 197 CCATT teams in the inventory (including Active Duty, National Guard, and Reserve elements)

Another significant development in evacuation is the development of the Special Medical Augmentation Response Team (SMART). In the case of patient movement from

OEF/OIF, one of the most essential teams has been BAMC's SMART-B or SMART burn team. This team is designed to provide technical expertise in the area of burn triage, resuscitation, management, and evacuation. This team has developed the ability to be as mobile as possible. The equipment that the team carries is easily transportable and packaged to fit on most aircraft in the system.

The team's mission consists of routine movements of 1-2 patients, Mass Casualty (MASCAL) capabilities of moving up to 20 patients, deployment to an austere environment, and augmentation of other kinds of medical and non-medical reaction teams. Given sufficient notice and resourcing, the SMART-B team is capable of projecting a remote 'burn center' to environments around the world (ISR, 2006).

Review of Evacuation Policies in the Department of Defense

The Assistant Secretary for Defense for Health Affairs (ASD(HA)) is responsible for DoD policy on medical regulation of wartime and peacetime patients. Several policies, directives, memorandums, and other documents set policy for what agencies are responsible for the various facets of this process. In review of these policies, there are several key documents that support the medical regulation of casualties from OIF and OEF. These documents are DoD Instruction Number 6000.11, DoD Directive Number 6000.12, DoD Directive Number 5154.6, Army Regulation 40-350, Army OTSG/MEDCOM Policy Memo 06-022, local theater policies, and specific AOR policies. For a complete list of all policies and references included in these policies see Appendix H.

The major directive in all of these policies is DoD Instruction Number 6000.11, Subject: Patient Movement, which implements policy, assigns various responsibilities,

and sets procedures by which the services must standardize medical regulation and implement the DoD global patient movement mission (DoD Instruction Number 6000, 1998). This policy also sets standards and/or procedures for not only patients, but medical and non-medical attendants, Patient Movement Items (PMI), and specialized care teams (CCATT, SMART, etc.).

In paragraph 6.2.3 of this policy, it states that:

> Movement of returning patients from deployments or contingency operations will be in accordance with established operations plans or other contingency-specific implementing instructions or guidance. Patients originating outside CONUS who are not expected to return to duty and patients being separated from the Component by reason of disability should be moved to an MTF or VA Medical Center nearest the patient's selected place of residence. Patients who are expected to return overseas should be moved to the closest MTF to port of entry. Hospitalized patients who are away from their duty station may be returned to an MTF nearest their duty station. (DoD Instruction Number 6000.11, 1998).

DoD Directive Number 6000.12 Subject: Health Service Operations and Readiness expands 6000.11 adding that the, "Commander in Chief (CINC) of U.S. Transportation Command (USTRANSCOM) shall be the DoD single manager for patient movement, other than intratheater patient movement" (DoD Directive 6000.12, 2003). Further, it directs CINCUSTRANSCOM to establish and maintain automated information systems (AIS) for medical regulating and movement, and provide standardized procedures for use of such systems by other DoD units and resource providers. Additional responsibilities in this directive assign CINCTRANSCOM ensure that

Combatant Commanders in theater have local TPMRCs assigned to carry out this mission.

DoD Directive Number 5154.6 in 5.4.1 and 5.4.2 states that the CINCTRANSCOM, "serve as single manager for the implementation of policy and the standardization of procedures and ISS for inter-theater medical regulating of Uniformed Services patients. Establish procedures, as necessary" (DoD Directive Number 5154.6, 2005). Further, that CINCTRANSCOM establish a global network system to assist in the command and control of inter-theater medical regulating … and provide the ability to locate and track Uniformed Services' patients being medically evacuated. In today's ongoing operations, the global network is present in both the TRAC2ES system and the JPTA as well.

All of these policies set the stage for OTSG/MEDCOM Policy Memo 06-022 Patient Movement from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) to US/CONUS-based Military Treatment Facilities (MTFs) currently dated 20 September 2006. While this policy states its purpose as providing guidance on requesting exception to policy for patient movement, in effect it has become the standard for setting policy for the main effort of regulating. This policy gives guidance on the use of TRAC2ES, primary criteria for medically regulating Soldiers, exceptions, OCONUS issues, and other criteria. The policy is an update to the previous policy dated 15 July 2005.

The first topic covered in this policy is that of ensuring that all originating MTFs, Medical Hold Units, and Soldier processing activities enter patients into the TRAC2ES system. These entries, called Patient Movement Requests (PMRs), are vital for the entire

system to maintain positive control and accountability of patients being regulated through the system. As discussed earlier, TRAC2ES serves as a source for JPTA and the combination of these two systems are the foundation for recording movement, care, and in-transit visibility on Wounded Warriors coming back from the CENTCOM AOR.

Secondly, this guidance establishes, "The primary criteria for medically regulating Soldiers to specific MTFs is the Soldier's medical requirements (Policy Memo 06-022, 2006). This guidance involves making the decision as to what level of MTF the soldier can reasonably be sent. Primarily, WRAMC and BAMC are the two main centers for amputees and other traumatic injuries with BAMC being the sole provider for serious burn injuries. However, short of those specialized requirements, each MEDDAC in CONUS requires close coordination to ensure their facility has the resources to care for that patient.

The policy also establishes that "All Mobilized/Demobilized Reserve Component, Army Reserves, and Army National Guard (RC), as well as AC Soldiers assigned to RC deployed units, will be medically regulated to the closest MTF servicing or having geographical area of responsibility for their Mobilization/Demobilization Site" (Policy Memo 06-022, 2006). This section goes on to say that if that MTF cannot provide the necessary level of care, the closest MTF having geographical responsibility (See Appendix F) will be the next step in making the patient regulating decision. One of the difficulties with RC soldiers is when there is not an MTF close to their home. Medical regulators need to work hard at coordinating with individual facilities to ensure these Wounded Warriors are regulated to the right location.

Short of traumatic amputation, burn, or other specialized care, the guidance is very specific that soldiers stationed in Hawaii must be regulated to Tripler Army Medical Center (TAMC); and in the case of being assigned to Puerto Rico, Wounded Warriors should be regulated to Dwight D. Eisenhower Army Medical Center (EAMC), Georgia. This policy also reiterates that, "All burn patients will be regulated to the burn center located at BAMC, and Soldiers diagnosed with conditions such as Leishmaniasis will be regulated to BAMC or WRAMC" (Policy Memo 06-022, 2006).

Methodology and Procedures

The book Dictionary of Statistics & Methodology: A Nontechnical Guide for the Social Sciences (1999) by W. Paul Vogt relates how the exploratory research design "looks for patterns, ideas, or hypotheses, rather than research that tries to test or confirm hypotheses." He further explains that exploratory data analysis can take on any of several methods that seek to discover unanticipated patterns and relationships, often by presenting quantitative data visually (Vogt, 1999).

To address the degree to which the research question has been crystallized, this research study exhibits very strong qualities of an exploratory nature. The exploratory study places emphasis on finding patterns in the data that relate to the proper placement of Wounded Warriors in the Medical Treatment Facility (MTF) that can best meet the medical and family support needs of that Wounded Warrior. The data sources for this study were specified as:

(1) The Personal Interview database of patients (n=86) interviewed by Mr. Clyde Landry, Case Manager, Brooke Army Medical Center (BAMC) over a period of 60 days in 2006 conducted at Walter Reed Army Medical Center (WRAMC).

(2) Amputee Care Program database (n=224) of patients entered and maintained by WRAMC and BAMC.

(3) Data drawn for FY2006 from the Joint Patient Tracking Application (JPTA)

(4) Data drawn for FY2006 from the U.S. Transportation Command's Regulating and Command and Control System (TRAC2ES).

The method of data collection completed by Mr. Landry was largely an interrogation/communication study, where, "the researcher questions the subjects and collects their responses by personal or impersonal means" (Cooper & Schindler, 2003). Mr. Clyde Landry, personally, interviewed an estimated 200 patients at WRAMC and reduced these recorded interviews to 86 personnel who seemed to best meet the criteria of the OTSG Memo, or who simply desired follow-on or continued care at BAMC.

However, due to the fact that this study is also concerned with describing or explaining some of the potential effects of these factors (why a patient decided not to continue care at BAMC), it takes on potential causal study opportunities for further research. If this study is used as a basis for further studies, most certainly they will be causal studies that seek to describe in more depth why these decisions were made utilizing the data of this study as a baseline for future data collection, development, and testing. However, for the purposes of this study, the author will relate and describe factors defined by the data set utilized.

In the case of this study, patients' exact basis for their individual decisions could not be examined in more depth. The study is more focused on breadth than depth with particular focus on discovering patterns based on those decisions.

Data

Preparation of the Data

Figure 3 represents the process by which the analytical data set was constructed from data obtained by Mr. Clyde Landry, representative from BAMC Patient Administration. Mr. Landry interviewed several hundred patients receiving care at

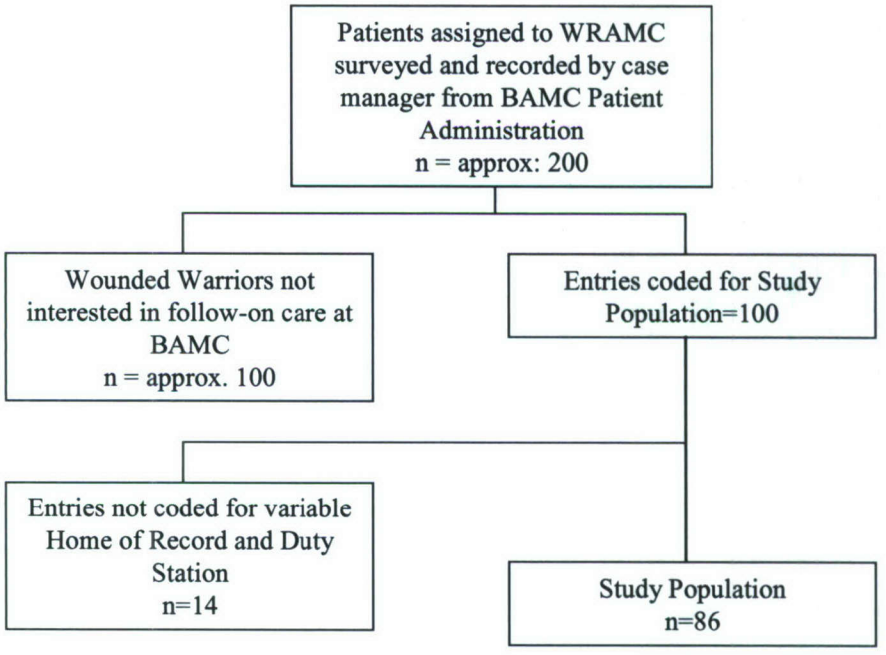

Figure 3. Process for constructing the Personal Interview analytical data set (Based on Figure 2 from Aeromedical Evacuations from Operation Iraqi Fredom: A Descriptive Study, Harman, 2005).

Walter Reed Army Medical Center. Of this set of patients, he was able to record data on 86 individual patients. These interviews were conducted between 8 August 2006 and 8 October 2006. The resulting spreadsheet of interviews contained multiple entries with incomplete data. For the purposes of this study incomplete data entries were eliminated from the study population.

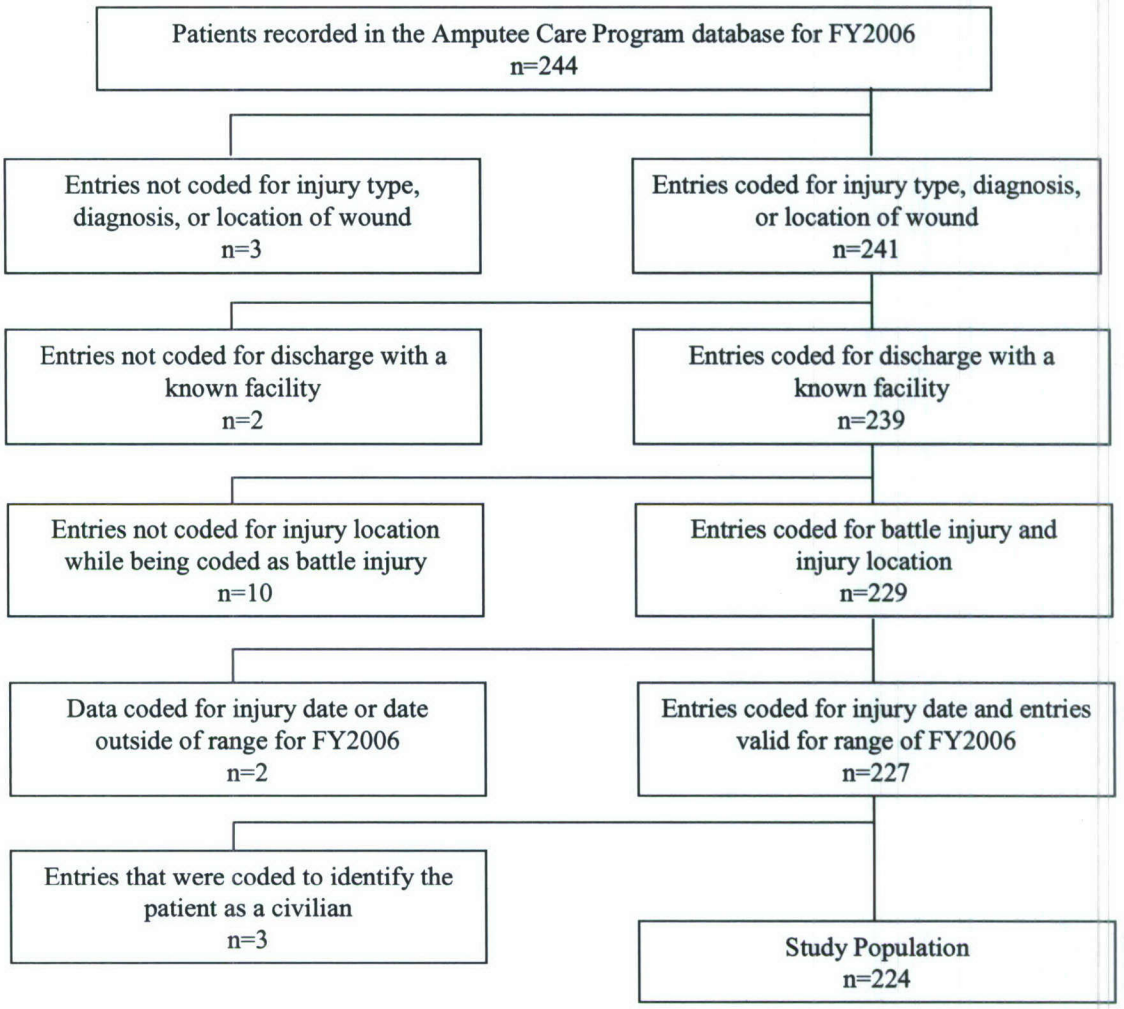

Figure 4. Process for constructing the Amputee Care Program database analytical data set (Based on Figure 2 from Aeromedical Evacuations from Operation Iraqi Fredom: A Descriptive Study, Harman, 2005).

Figure 4 (above) represents the process by which the analytical data set was constructed from data obtained from the Amputee Care Program database. For FY2006 there were 244 entries in the database. These entries represent Wounded Warriors that were admitted either on an inpatient or outpatient basis to WRAMC, BAMC, or NMCSD. These entries were further reduced on the basis of incomplete data for this study.

Validity and Reliability

This study also sought to ensure proper data validity and reliability. The data taken from the database built by Mr. Clyde Landry, had the integrity maintained by having only one researcher in possession of this data set and measuring exactly what is was supposed to measure: desire to continue care at a chosen facility. The reliability of this data is extremely high. Each Wounded Warrior was personally interviewed by Mr. Landry at WRAMC. Each Wounded Warrior, further, was scrutinized by Mr. Landry as to his or her reported correctness and accuracy. The data set was consistent and stable. The data are valid in that the data collection instrument does accurately measure what it is supposed to measure and to that extent of this measure is systematic error free.

The data taken from the Amputee Care Program database is based on the supervision of Dr. Chuck Scoville and Dr. Rebecca Hooper. This database is continually updated and maintained by WRAMC and BAMC, therefore the reliability is very high. The validity of this data, also, is very high due to the fact that each of the factors within this data set reflects the demographics which are sought.

Data taken from the Joint Patient Tracking Application and U.S. Transportation Command Regulating and Command and Control System (TRAC2ES) are also reliable and valid. The reliability of this data comes from a continuous updating process that takes place as Patient Movement Requests (PMRs) are being updated in the system. The validity of this data is also high, because the data is measuring the demographic factors it seeks to measure.

Results

To approach an understanding about casualties sustained by the United States in FY2006, this author will provide a purely exploratory analysis of the factors in the personal interview and Amputee Care Program databases, and secondarily provides a broad overview of JPTA and TRAC2ES database data for FY2006. However, primary focus will remain on the personal interview and Amputee Care program databases. Each of these data sets provides an increased awareness of the demographics of Wounded Warriors returning from OEF and OIF. Complete Tables and Figures for these database factors can be found in Appendices B through E.

Data Results for personal interview database.

Of the 86 patients that were interviewed (See Table 2 below) and their information recorded by Mr. Clyde Landry, 39 patients (45.3%) had received some type of amputation wound. 47 of the wounded warriors (54.7%) had received non-amputation wounds, illnesses, or psychiatric wounds from OIF/OEF.

Table 2. Diagnosis of Wounded Warriors Interviewed at WRAMC.

Diagnosis	n	Percent
Amputation Injury	39	43.35%
Injury other / Illness	47	54.65%
Total	86	100.00%

38 of the wounded warriors (44.19%) had a Duty Station (DS) located within the Western Region (WR) (See Appendix B, Table B.2) 16 wounded warriors (18.60%) were assigned to various bases in the Eastern Region (ER). 11 of the wounded warriors (12.79%) were assigned to military bases outside the Continental United States (OCONUS). 21 of these wounded warriors (24.42%) in this data set, unfortunately, did not have their duty station indicated or recorded.

Sixty Four of the wounded warriors (74.4%) did have a current Home of Record (HOR) (See Appendix B.3) that fell within the WR of the United States. 10 of the wounded warriors claimed the eastern United States as home. One of the wounded warriors had a HOR listed outside CONUS (Puerto Rico). Once again, 11 of the wounded warriors in this study failed to have their home of record recorded.

Twenty Six of the wounded warriors (30.2%) surveyed wanted to continue their care at Brooke Army Medical Center in San Antonio, Texas (See Appendix B.4). 51 of the wounded warriors (59.3%) made the decision that they wanted to continue receiving care at Walter Reed Army Medical Center.

For the military personnel who wanted to continue receiving care at BAMC, 20 of those surveyed (76.92%) made their decision based on personal or family reasons. Five of this population (19.23%) made their decision for unknown or other reasons not specified. The one remaining wounded warrior made his/her decision due to desire to complete their Physical Evaluation Board (PEB) or other Medical Evaluation Board (MEB) at BAMC.

Looking at this data more specifically, six of the 26 who desired continued care at BAMC (23.08%) had a duty station and home of record that were both part of the WR. One Wounded Warrior (3.85%) had a DS in the WR and a HOR in the ER. Five (19.23%) had a DS of ER and HOR of WR. Three (11.54%) had a DS of ER and HOR of ER. Two Wounded Warriors (7.69%) had a DS of OCONUS and HOR of WR. One person (3.85%) had a DS of OCONUS and HOR of ER. Finally, one patient had a DS or OCONUS and a HOR of OCONUS.

For wounded warriors who wanted to continue receiving their care at WRAMC, 22 of those interviewed (43.14%) decided that continuing or completing their rehabilitation was more important than moving to another facility. 16 of these personnel (31.37%) made their decision based on family situation or other personal reasons. Seven (13.73%) felt that continuing an ongoing PEB/MEB was reason enough for them to stay in the Walter Reed facility. Two of the warriors (3.92%) indicated that their End of Time in Service (ETS) or retirement were too close to change facilities. Finally, four of those surveyed (7.84%) made the decision for unknown or other reasons.

For three of the patients in this population that were asked about transferring out of WRAMC (3.5%), two patients (66.7%) made the decision that Naval Medical Center San Diego would be the best location for them to continue their care. One wounded warrior of this subset of the population (33.3%) is unknown or made the decision for a reason not categorized for this study.

Six of the personnel involved in this study (7.0%) were undecided as to which location would be best for them to continue receiving medical care for their injuries. As of the first week in October of 2006, they had not made a decision and continued to receive care at Walter Reed.

This data also showed that 14 personnel who decided to stay (27.45%) had a DS and HOR in the Western Region. Four (7.84%) had a DS of WR and HOR of ER. Three of those interviewed (5.88%) had a DS of WR and HOR that was unknown or not recorded. Six of those responding (11.76%) had a DS of ER and HOR of ER. One person responding to these interviews (1.96%) had a DS and HOR in the Western Region. Five Wounded Warriors (9.8%) listed a DS of OCONUS and HOR of WR. One

respondent ((1.96%) had a DS of OCONUS with a HOR unknown or not recorded. Finally, 12 interviewees (23.53%) had a DS that was unknown but a HOR of WR.

Finally, of the 86 Wounded Warriors that were interviewed with Mr. Landry; three (3.49%) chose NMCSD (Balboa) as their facility of choice and six (6.98%) continued to be undecided. Since these interviews, it is unknown by this author as to the follow-up choices each one made subsequent to these interviews. Further studies might seek to determine these final outcomes.

Data Results for the Amputee Care Program database:

244 Wounded Warriors were entered into the Amputee Care Program Database maintained by WRAMC and BAMC for FY2006. Of these records (as previously discussed) only 224 records for FY 2006 were utilized for this analysis. Of these 224 records, only the categories of Care Facility (CAREFAC), Rank (RANK), Military Service (SERVICE), Service Component (COMPON), Age (AGE), Event of injury (EVENT), Duty Station (DUTYSTAT), Injury Date (INJDATE), Injury Mechanism (INJMECH), Injury Location (INJLOC), and Injury Type (INJTYP) were utilized. Based on these factors the following paragraphs demonstrate the results of these factor analyses.

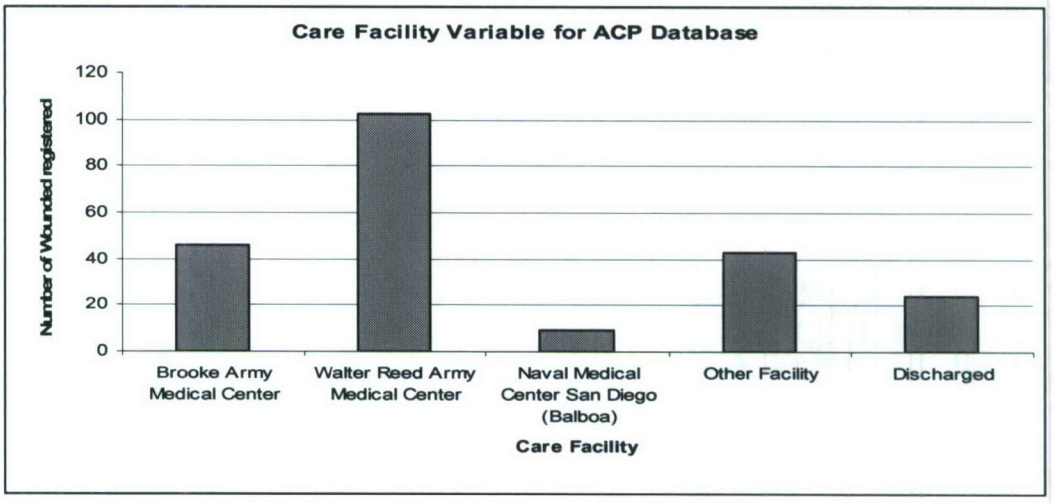

Figure 5. Care Facility Factor for ACP Database.

The factor of Care Facility (See Figure 5 above), once again, was categorized as Brooke Army Medical Center, Walter Reed Army Medical Center, Naval Medical Center San Diego (Balboa), other facilities, and a category of patients that had been discharged. Based on these categories and 224 Wounded Warriors; 46 (20.5%) were currently receiving care at BAMC, 102 (45.5%) Wounded Warriors were receiving care at WRAMC, 9 (4.0%) were receiving care at Balboa, 43 (19.2%) were receiving at various facilities, and 24 (10.7%) had been discharged from regular ongoing care. Finally, from this data, it is demonstrated that two times as many Wounded Warriors were receiving care at WRAMC versus BAMC for FY2006. Data for this table is summarized in Appendix C.1.

Of the 102 personnel that were evacuated and receiving care at WRAMC, 20 (19.6%) had a duty station that was located within the Western Region of the United States. However, of the 46 Wounded Warriors that were receiving care at BAMC, 12 (26.1%) had a duty station listed as the Eastern Region.

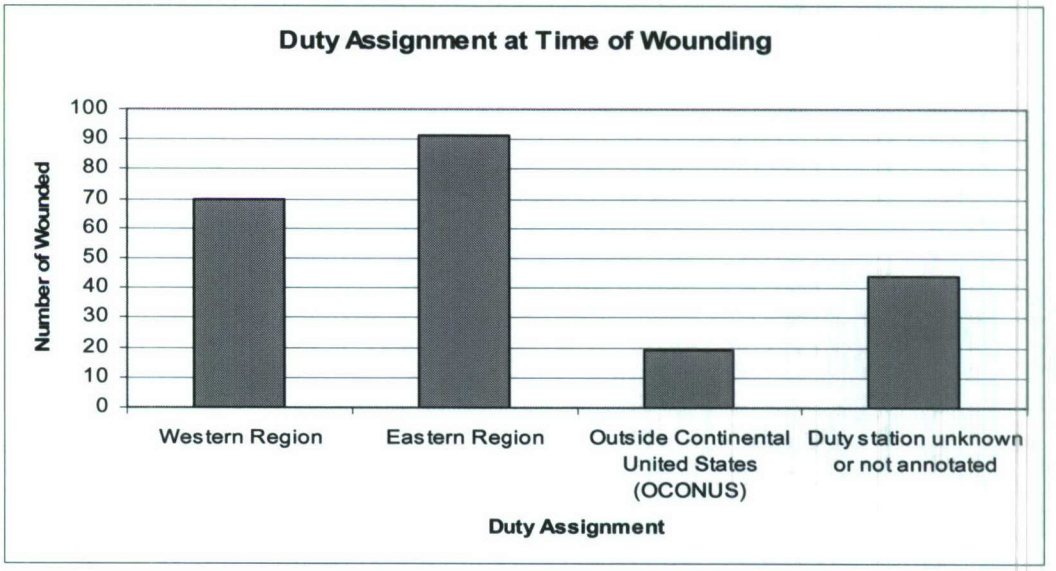

Figure 6. Duty Assignment at Time of Wounding.

For the sample factor Duty Station (DUTYSTAT), 70 Wounded Warriors (31.3%) had a duty station of the Western Region (see Figure 6 above), 91 (40.6%) were stationed in the Eastern Region, 19 (8.5%) were stationed OCONUS, and 44 (19.6%) were missing data as to their duty station.

Looking further at the rank demographics for Wounded Warriors; one (.4%) was in the rank of E1, 14 (6.3%) E2, 47 (21.0%) E3, 88 (39.3%) E4, 29 (12.9%) E5, 26 (11.6%) E6, four (1.8%) E7, one (.4%) E8, two (.9%) 01, seven (3.1%) 02, and five (2.2%) were 03s. Figure 7 (below) relates, pictorially, how these ranks are distributed. The ranks of E2 through E4 were the highest rank structure to be wounded. This segment of the rank structure composed 164 (73.2%) of Wounded Warriors for FY2006.

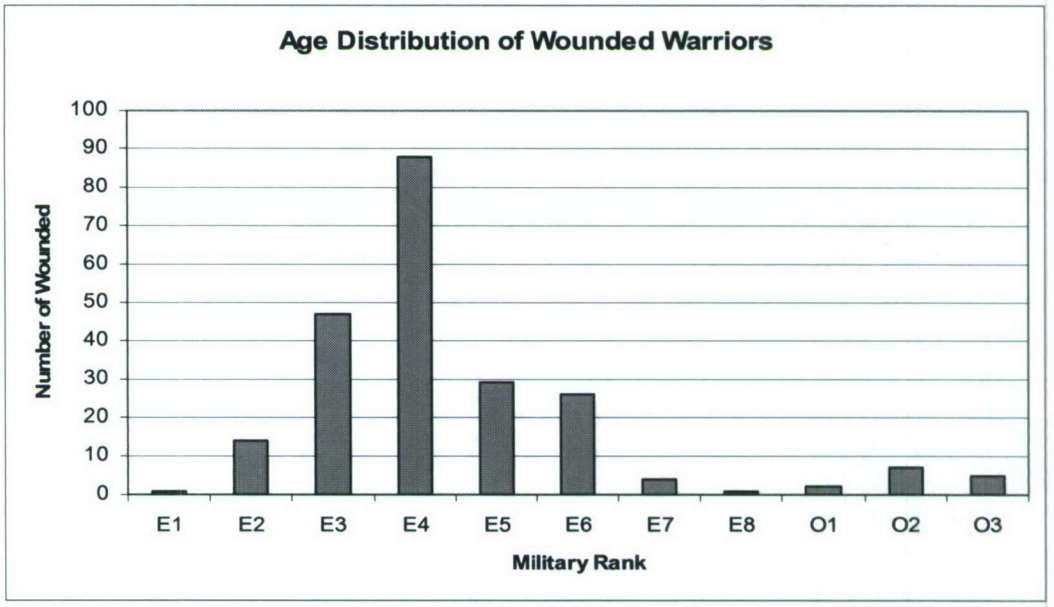

Figure 7. Age Distribution of Wounded Warriors

Breakdown by service (See Figure 8 below) revealed that 159 (71%) were from the United States Army, 54 (24.1%) were Marines, 10 (4.5%) from the Navy, and one (.4%) from the Air Force. These numbers might be expected given the predominately larger combat roles of the Army and Marines in combat in Iraq and Afghanistan.

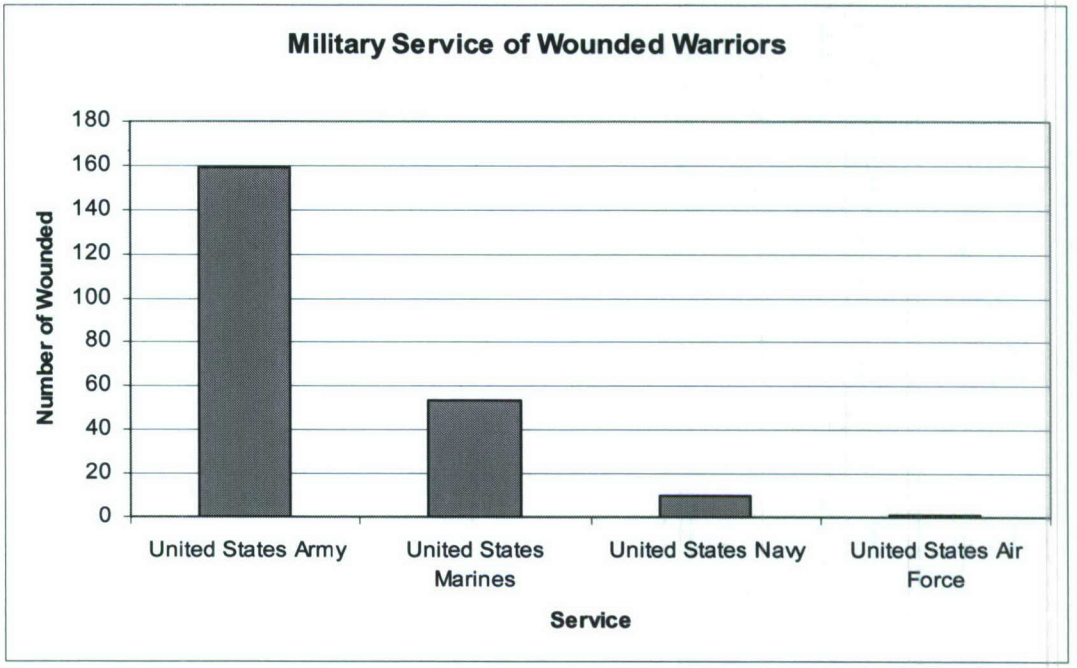

Figure 8. Military Service of Wounded Warriors

Ages of Wounded Warriors in the Amputee Care Database ranged from Age 19 to Age 54 revealing a span of 35 years. Appendix C.5 shows the frequency and percentage breakdown of this data set. The largest age range of this sample, however, was from age 20 to age 22 showing 92 (41%) of those wounded and entered into the Amputee Care Database for FY2006.

The event factor (EVENT) represents the breakdown of Wounded Warriors resulting from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF). Of this population 219 Wounded Warriors (97.8%) were veterans of OIF and the remaining 5 (2.2%) veterans of OEF.

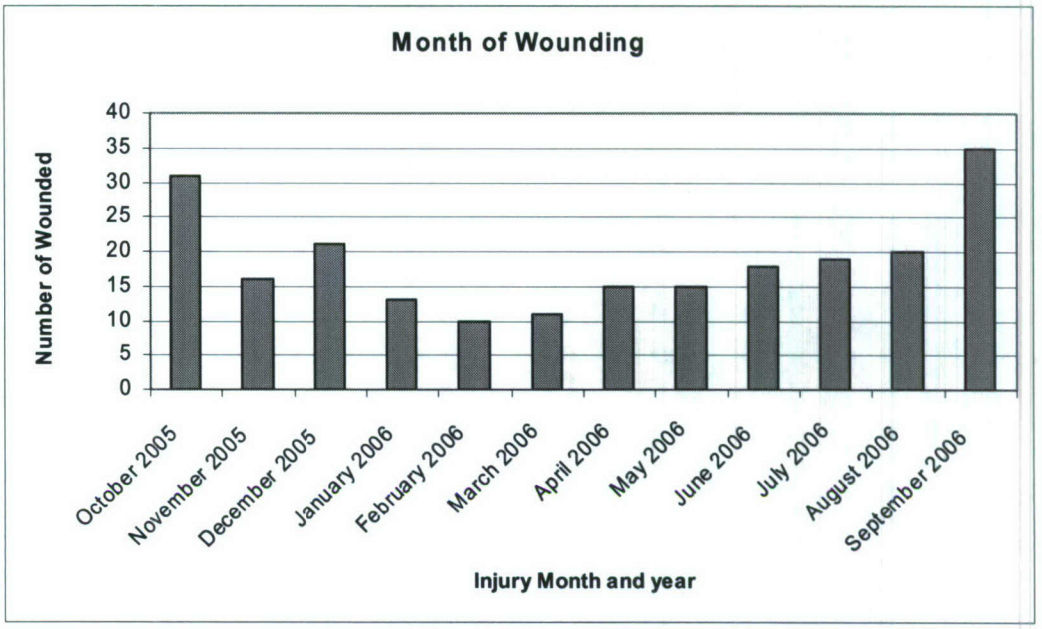

Figure 9. Month of Wounding.

When the Injury Date (INJDATE) factor was examined (see Figure 9 above); a full 66 Wounded Warriors (29.4%) had been injured in a two month period from December 2005 to January 2006. The smallest number of 21 Wounded Warriors (9.4%) had been wounded in the May 2005 to June 2006 timeframe.

The factor Injury Mechanism (INJMECH) was defined in the following categories based on data from this sample set (See Figure 10 below). First, any injuries sustained from or related primarily to the Improvised Explosion Device (IED) were given the label IED. This category resulted in 154 (68.8%) of injuries. The second label for this category was that of records which indicated a blast injury not directly from an IED. Six (2.7%) of these personnel were listed as blast injuries. Six (2.7%) of this registry showed the Wounded Warrior having received injuries directly related to the grenade weapon. Seven (3.1%) were wounded by some sort of Mortar Fire and another three (1.3%) due to land mines. Injuries resulting from Gun Shot Wounds (GSW) amounted to 14 (6.3%) and another five (2.2%) resulting from the Rocket Propelled Grenade (RPG). Another large

group of Wounded Warriors sustaining similar wounds was the label of Crash / Accidents which resulted in 47 amputations or 21.0%. 22 Wounded Warriors received crush injuries (8.8%) and two patients (.4%) having sustained wounds listed as other.

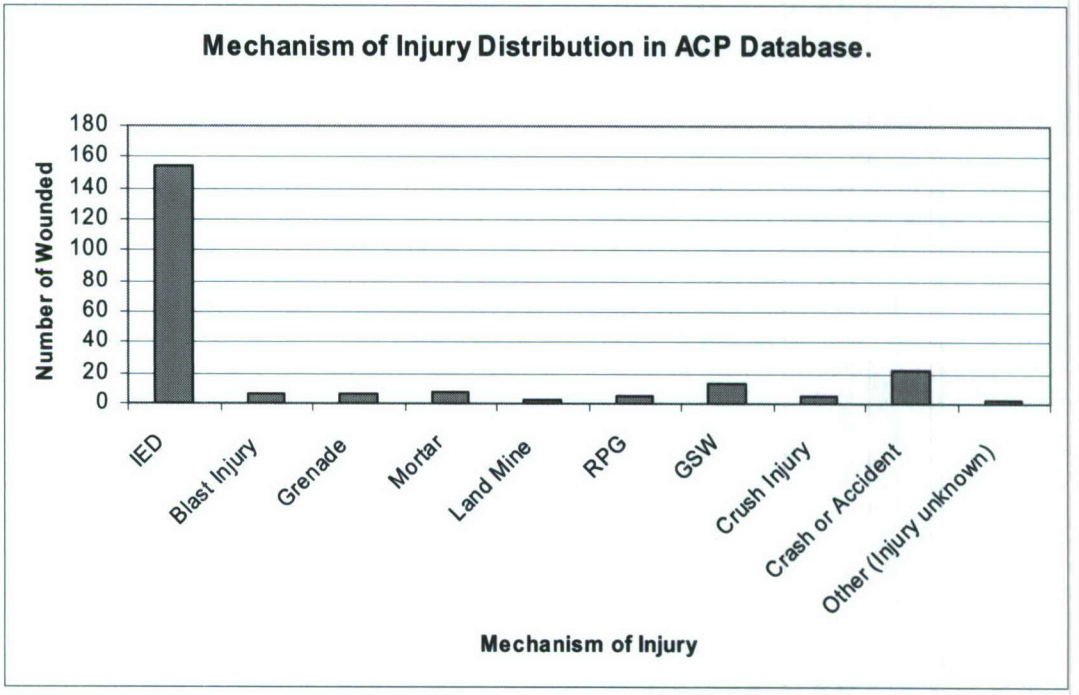

Figure 10. Mechanism of Injury Distribution in ACP Database.

In relation to where on the body the Wounded Warrior sustained his or her wounds, the following labels further describe this factor (See Figure 11 below). First was injuries sustained to the thumb, fingers, hand or foot. 57 Wounded Warriors (25.40%) sustained these types of injuries. Unilateral Above the Knee (AK) injuries resulted in 35 (15.60%), bilateral AK were five (2.20%), unilateral Below the Knee (BK) injuries comprised another 35 (15.60%), bilateral BK was 15 (6.70%), and finally five (2.20%) combination bilateral AK/BK injuries. Unilateral Below the Elbow (BE) amputations resulted in 11 (4.90%) and bilateral Above the Elbow (AE) another 11 (4.90%). Combination of BE/BK showed two (1.00%) and one (.50%) AE/AK Wounded Warrior. The category of Other Orthopedic Injury and Multi-Trauma resulted in 47 (21.00%).

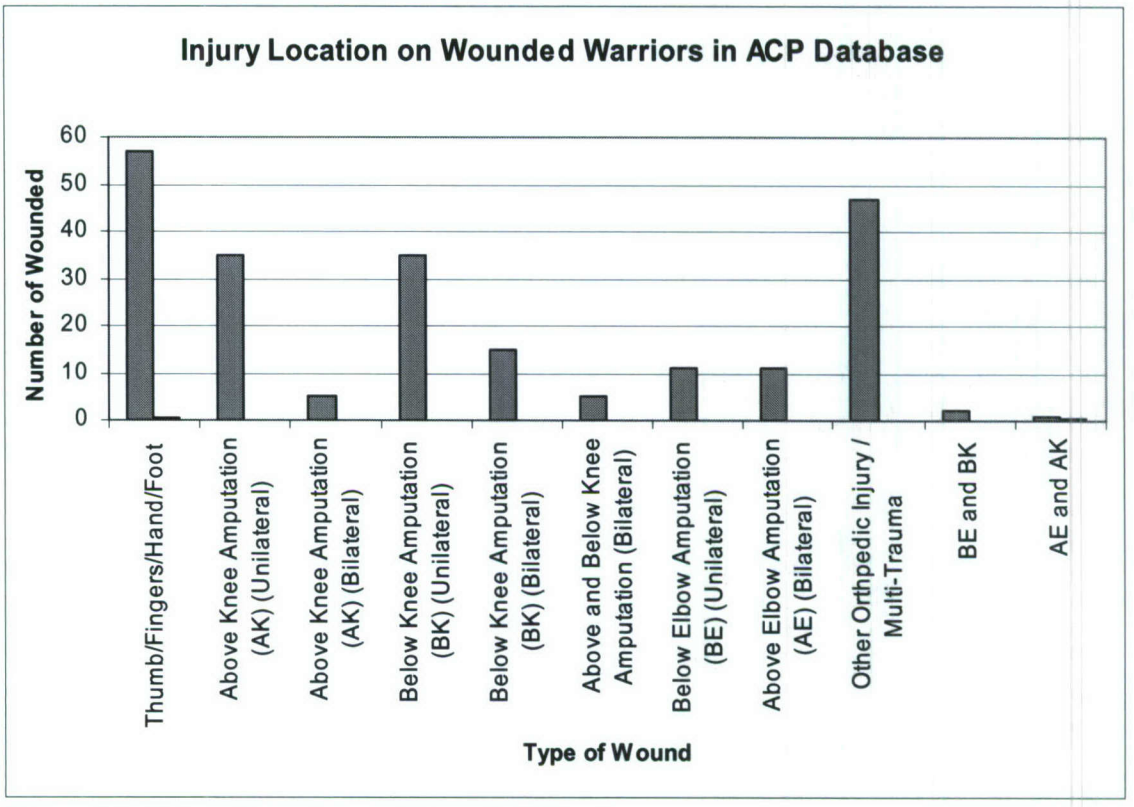

Figure 11. Injury Location on Wounded Warriors.

Data Results for data taken from the Joint Patient Tracking Application (JPTA).

Brooke Army Medical Center

For Fiscal Year 2006, the Joint Patient Tracking Application reveals that 406 patients were evacuated through validated Patient Movement Requests from OIF/OEF to CONUS-based Brooke Army Medical Center.

Of these 406 patients Battle Injuries were 280 (68.97%), Non-Battle Injuries 70 (17.24%), and those listed as Disease 56 (13.79%). Breakdown by service shows 331 Army (81.53%), 53 Marines (13.05%), 7 Navy (1.72%), five Air Force (1.24%), seven Civilians (1.72%), two Contractors (.49%), and one person listed as Other (.25%). Personnel breakdown by Military Operation revealed that 348 personnel (85.71%) were wounded in Operation Iraqi Freedom, 52 wounded (12.81%) were a result of Operation

Enduring Freedom in Afghanistan, and 6 wounded (1.48%) with Operation listed as Other.

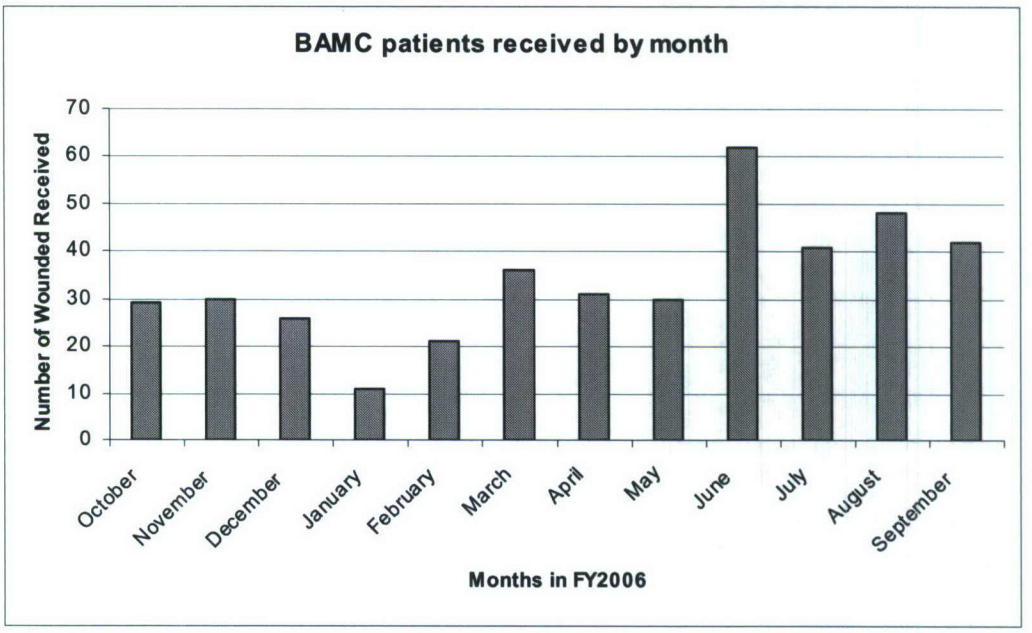

Figure 12. BAMC Patients Received by Month.

Patients Per Month (See Figure 12 above) received at BAMC shows 29 in October 2005 (6.65%), 30 in November (7.39%), 26 in December (6.40%), January 2006 had 11 (2.71%), 21 in February (5.17%), 36 in March (8.87%), 31 in April (7.64%), 30 in May (7.39%), another 62 in June (15.28%), 41 in July (10.34%), 48 in August (11.82%), and finally 42 in September of 2006 (10.34%).

In addition to the above numbers, Brooke Army Medical Center serves as the only American Burn Association verified burn center for the DoD. During FY2006, BAMC also received 173 patients classified with various types of burn injuries. Starting in October of 2005 the ISR received 22 (12.72%), 12 in November (6.94%), 15 in December (8.67%), January 2006 had 6 (3.47%), 4 in February (2.31%), 16 in March (9.25%), 11 in April (6.36%), 6 in May (3.47%), another 21 in June (12.14%), 16 in July (9.25%), 26 in August (15.02%), and finally 18 in September of 2006 (10.40%). Of

special note: 64 of those severely burned Wounded Warriors (37%) were flown by the Special Medical Augmentation Reaction Team - Burn (SMART-B) of the Institute of Surgical Research (ISR).

For Fiscal Year 2006, the Joint Patient Tracking Application reveals that 920 patients were evacuated through validated Patient Movement Requests from OIF/OEF to CONUS-based Walter Reed Army Medical Center.

Of these 920 patients Battle Injuries were 451 (49.02%), Non-Battle Injuries 127 (13.81%), and those listed as Disease 342 (37.17%). Breakdown by service shows 856 Army (93.04%), 20 Marines (2.17%), five Navy (.54%), 15 Air Force (1.64%), two contractors (.21%), civilians (.76%), and 15 listed as other (1.64%). Personnel breakdown by Military Operation revealed that 767 personnel (83.37%) were wounded in Operation Iraqi Freedom, 141 wounded (15.33%) were a result of Operation Enduring Freedom in Afghanistan, and 12 wounded (1.30%) with Operation listed as Other.

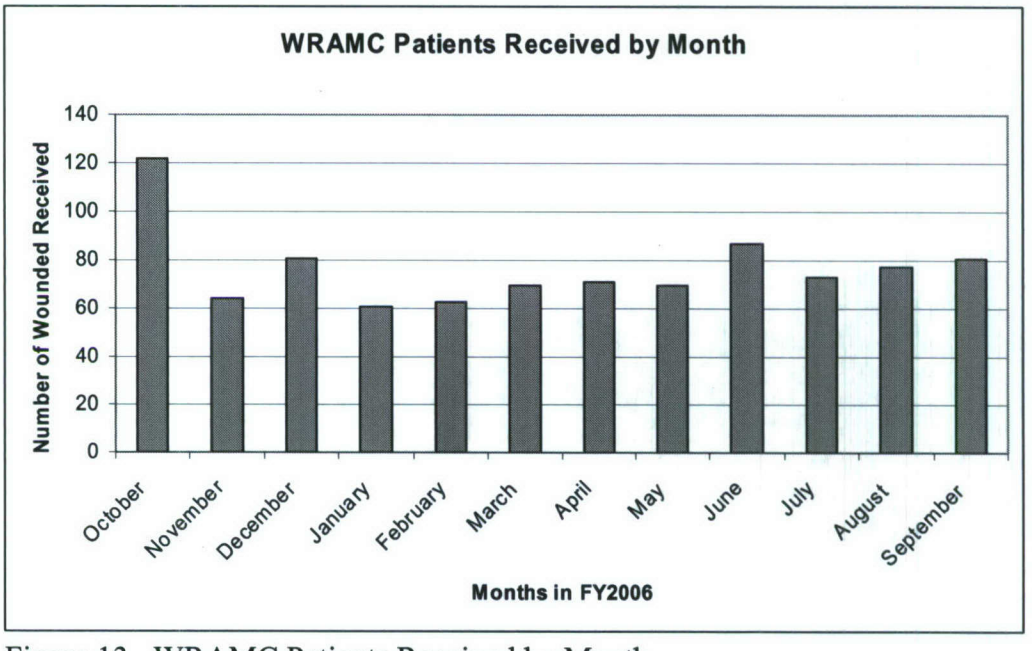

Figure 13. WRAMC Patients Received by Month.

Patients Per Month received at WRAMC (See Figure 13 above) shows 122 in October 2005 (13.26%), 64 in November (6.96%), 81 in December (8.80%), January 2006 had 61 (6.63%), 63 in February (6.85%), 70 in March (7.61%), 71 in April (7.72%), 70 in May (7.61%), another 87 in June (9.46%), 73 in July (7.93%), 77 in August (8.37%), and finally 81 in September of 2006 (8.80%).

Data Results for data taken from the TRANSCOM Regulating and Command & Control System (TRAC2ES).

For FY2006 the TRAC2ES database identifies 4087 patients moved inter-Theater from CENTCOM to EUCOM, 3,240 moved from EUCOM to CONUS, and 600 from CENTCOM to CONUS. Movements from CENTCOM to EUCOM (4087) resulted in 243 (5.95%) urgent movement, 1,048 (25.64%) as priority, and 2,796 (68.41%) as routine. Of the EUCOM to CONUS movements (3,240) two patients (.06%) were classified as an urgent movement, 134 (4.14%) as priority, and 3,140 (95.80%) as routine. Finally, of the 600 patient moves from CENTCOM to CONUS - three of those movements (.5%) were listed as urgent, 5 (.83%) priority, and 592 (98.67%) as routine.

Discussion

Data taken from the Personal Interview database demonstrated one interesting pattern, that of the Home of Record. 68 of the 86 Wounded Warriors interviewed (74.4%) had a HOR in the Western Region. This is a disproportionate number, given that just over half of them had a duty station in the Eastern Region. In the interviews done by Mr. Landry, alone, 38 out of the 86 Wounded Warriors (44.2%) that were interviewed had a duty station that was in the Western Region. Another 64 of the 86 (74.4%) had a

home of record in the Western Region. 23 (26.75%) had both a duty station and home of record in the Western Region.

A pattern found in the Amputee Care Program database was based on raw numbers (102 WRAMC to 46 BAMC) which demonstrated that there were twice as many Wounded Warriors receiving care at WRAMC. This situation suggests that patients coming out of Theater may be getting stuck at Walter Reed when they should have been further regulated to a different destination. With the current focus on conditions and slower processes being experienced at WRAMC, it is all the more important to begin looking at ways to alleviate this pressure and begin moving the care for our Wounded Warriors to facilities that are not as burdened.

Another pattern was that this same database found 164 Wounded Warriors (73.2%) were in the rank of E2 to E4. This segment of the population of wounded is consistent with the overall rank population of the military in general. Given this pattern, it serves to place more credibility on the face validity of the data.

Looking at the number of wounded received at BAMC by month in the JPTA it was observed that during the timeframe of December 2005 to January 2006 there were 66 (29.4%) Wounded Warriors received for care. Almost 30% of the patients for the year were received in less than a 60 day period. This kind of flux of patients presents an opportunity for BAMC and other MTFs to start measuring these surges to better anticipate resources needed in the event of another surge.

Also noted from data in the Joint Patient Tracking Application for BAMC was that during the months of June through September of 2006 there were 193 patients out of the 406 for FY2006 which represented 47.78%. Almost half the patients were received

for the entire year in a very short window. For that same period, WRAMC received 318 patients which is 125 more than BAMC, but represents only 34.57% of the Wounded Warriors they received for the year. Despite the percentage of patients being lower, the larger number still represents a potential population of patients that conceptually might have been regulated to BAMC or NMCSD.

In a recent Memorandum to the Commander-in-Chief, Global Patient Movement Requirements Center at Scott AFB from Major General Gale Pollock, U.S. Army MEDCOM Commander and Acting Army Surgeon General; guidance was given to begin reallocating patients. This document requests that "WRAMC receive only Soldiers with major amputations (unit of assignment East of the Mississippi) and CCATT missions for a period of 30 days" (Pollock, 2007). This Memorandum goes on to state that "Soldiers normally regulated to WRAMC will be regulated to Womack Army Medical Center (WAMC) Fort Bragg, N.C." (Pollock, 2007). This memorandum, shortly after issue, was immediately rescinded.

Whatever the reason for rescinding this memo, it is a further observation that there is a growing consensus that patients are not being allocated as efficiently as possible. Of the facilities currently in the DoD system, BAMC is prepared to receive these casualties; specifically the ones that have a duty station or home of record in the Western Region. OTSG/MEDCOM Memo 06-022 provides the guidance; the issue now is one of focus on compliance. Medical regulators at all levels, especially in EUCOM, should place an increased level of focus on these factors prior to entering PMRs into the system.

Conclusions

The Personal Interview database obtained by Mr. Landry, the demographics of Wounded Warriors in the Amputee Care Program database, the monthly number inequalities found in the JPTA database, and the numbers discussed previously in the discussion section of this project; suggest more Wounded Warriors should be regulated or transferred to BAMC or NMCSD. Proper regulation of patients could potentially alleviate some of the pressures in the system, particularly for WRAMC.

Twenty-six of the 86 Wounded Warriors in this sample (30.23%) expressed a strong desire to continue their care at BAMC. The remaining 60 personnel expressed many reasons to stay. However, based on the interview of Mr. Landry, many of these Wounded Warriors expressed that had they been afforded an opportunity earlier in the hospitalization and rehabilitation process and before their families settled into their current surroundings, they would have chosen that offer. Once again, these families should be relieved of this burden earlier in the process by medical regulators and sending physicians, thereby ensuring patients were regulated proportionally. Executing this proper regulation early on in the process eliminates the family stress, cost, and logistical requirements required to regulate these Wounded Warriors to another facility at a later date. Additionally, it should be noted that 21 Wounded Warriors (24.42%) in the Personal Interview database sample did not have their duty station indicated or recorded. However, it can be posited that a portion of these patients would want or could be transferred to BAMC for follow on care ensuring the Wounded Warrior is regulated to the proper DoD MTF early in the process.

During the course of this research, numerous conversations with Patient Administration Officers, Physicians, an Officer who had been a patient in the process, and leaders at all levels agree that the Wounded Warrior should first be regulated in accordance with established policies, but at the very least the family should be given the choice earlier in the process before they firmly establish themselves in the facility to which they were regulated. Many Wounded Warriors and their families become attached to their surroundings and their providers, as would be expected. Medical providers become the lifeline of families experiencing this kind of tragedy and these bonds have been shown to be very strong. In the interest of the patients, their families, and the MHS Wounded Warriors should be regulated appropriately before this bonding process begins.

This process starts in the Landstuhl Regional Medical Center (LRMC) in Landstuhl, Germany. Patient regulators at Landstuhl should take a close look at the process by which they regulate patients preferentially to WRAMC versus BAMC. Given the increasing pressure of casualties at WRAMC, it is all the more important to relieve this burden by sending casualties not only to BAMC, but to other facilities that can provide the care once the Wounded Warrior is further along in his or her healing and rehabilitation process.

Recommendations

The primary recommendation is to enforce policies and procedures that are currently in place. Ensure that patients who have a duty station and home of record in either the western or eastern region are regulated to that region. The problem arises when HOR and DS are from separate regions. OTSG/MEDCOM 06-022 seems to indicate that in this case duty station would be the primary destination. However, because family

members will be the primary support system, this decision should be made collaboratively between the medical regulator, physician, and family decision maker. The best location, potentially, might best be proximity to home rather than duty station, all medical decisions being equal.

Another recommendation to facilitate this process, would be for the DoD medical community to develop a process (be it a needs questionnaire, interviews, etc.) whereby the Wounded Warriors and their families are presented all of their options early on before the Wounded Warrior is placed in a particular facility. Specifically, this should be completed in an informative and unbiased manner explaining capabilities of the MTF, rank of the Wounded Warrior, its community resources, family support resources, local VA facilities, schools for children, and cost of living. This information would allow the Wounded Warrior and his or her family an opportunity to make the best decision, prior to settling into a particular MTF.

In an interview with LTC Renz, one of the recommendations that he proposed is that "At least one of the weekly channel missions should be directly routed to BAMC and that trauma patients assigned to units or living west of Mississippi should be manifested and or regulated on that flight" (Renz, 2007). This issue, in and of itself, is very important. While not substantiated by evidence or researched in this study, there is the possibility that any costs that would be incurred by flying this additional route might be saved by the offset of costs associated with TDY for the flight crew in the National Capital Region, costs of transferring from Andrews AFB to WRAMC and back again for future flights on to BAMC, and finally the cost to families staying in the National Capitol Region.

Dr. Renz commented further on this issue based on his experience and the experience of the Burn SMART-B Team. His experience demonstrates that flying from Ramstein AFB in Germany to Andrews AFB in Washington D.C. takes on average 9.2 hours. Andrews AFB to San Antonio International Airport (KSAT) is another 3.7 hours. Flying direct from Andrews AFB to KSAT is on average 12.1 hours.

Some of the benefits of initiating a new channel route include: (1) Western Region based Soldiers' proximity to duty station or home of record, (2) Lower cost of living in San Antonio, (3) Lower costs of TDY for family members coming to visit their Wounded Warrior, (4) Newer rehabilitation facilities (i.e. Center for the Intrepid (CFI)), and (5) a host of military installation facilities located at Fort Sam Houston, Texas.

While this study is only exploratory in nature, it does demonstrate that there is evidence of some disconnects between official policy and what actually occurs on the ground. While the primary concern is, and always will be, the medical needs of the patient, contextual factors such as duty station, home of record, individual desire, needs of family, and all of the individual reasons behind them should always be weighted in the final decision on where to place our Wounded Warriors. The decision to regulate these Wounded Warriors requires decisive action early in the process and often times quickly. General George Patton was quoted as saying, ""A good plan violently executed right now is far better than a perfect plan executed next week."

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Appendix A

Definition of Terms (Acronyms)

AE	Aeromedical Evacuation
AES	Air Evacuation System
AMC	Air Mobility Command
BAMC	Brooke Army Medical Center
BAS	Battalion Aid Station
BMIST-J	Battlefield Medical Information system Tactical-Joint
CCATT	Critical Care Air Transport Team
CDR	Composite Data Repository
CENTCOM	United States Central Command
CHCS-1T	Composite Health Care System – 1 Tactical
CHCS-2T	Composite Health Care System – 2 Tactical
CHS	Combat Health Support
CONUS	Continental United States
CR	Change Request
CSH	Combat Support Hospital
DA	Department of the Army
DoD	Department of Defense
EAD	Echelons Above Division
EAMC	Eisenhower Army Medical Center
EIDS	Executive Information and Decision Support
EMEDS	Expeditionary Medical Support - Air Force Hospital
EMR	Electronic Medical Record
EPW	Enemy Prisoner of War
EUCOM	United States European Command
FST	Forward Surgical Team
GEMS	Global Expeditionary Medical System
GPMRC	Global Patient Movement Requirements Center
GPRMC	Great Plains Regional Medical Command
ICU	Intensive Care Unit
IED	Improvised Explosive Device
ISR	Institute of Surgical Research - Brooke Army Medical Center
IT	Information Technology
JMEWS	Joint Medical Electronic WorkStation
JPMRC	Joint Patient Movement Requirements Center
JPTA	Joint Patient Tracking Application
LRMC	Landstuhl Regional Medical Center
MC4	Theater Medical Information Program (TMIP-Army)

MEDDAC	Medical Activity
MFST	Mobile Field Surgical Team - Air Force
MRR	Medical Readiness Review
MTF	Medical Treatment Facility
NIPR	Non-secure Internet Protocol Router
NIPRNET	Non-secure Internet Protocol Router Network
NMCSD	Naval Medical Center San Diego (a.k.a Balboa)
OASD(HA)	Office of the Assistant Secretary of Defense (Health Affairs)
OCONUS	Outside Continental United States
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OR	Operating Room
OTSG	Office of The Surgeon General
PAD	Patient Administration Division
PARRTS	Patient Accounting Real-time Reporting and Tracking System
PASBA	Patient Administration Systems and Biostatistics Activity
PCM	Patient Care Manager
PHI	Protected Health Information
PMR	Patient Movement Request
PRMC	Pacific Regional Medical Command
RMC	Regional Medical Command
SADR	Standard Ambulatory Data Record
SERMC	South East Regional Medical Command
SIPR	Secure Internet Protocol Router
SIPRNET	Secure Internet Protocol Router Network
TAMC	Tripler Army Medical Center
TAPDB	Total Army Personnel Data Base
TCCC	Theater Combat Casualty Care - operational
TMDS	Theater Medical Data Store
TMIF	Theater Medical Information File??
TMIP	Theater Medical Information Program
TPMRC	Theater Patient Movement Requirements Center
TRAC2ES	U.S. Transportation Command Regulating and Command and Control System
TSG	The Army Surgeon General
USAF	United States Air Force
USAFE	United States Air Forces in Europe
USTRANSCOM	U.S. Transportation Command
WRAMC	Walter Reed Army Medical Center

Appendix B

Figures and Tables for Personal Interview database (Appendix B.1 through B.5)

Appendix B.1. Decision of Wounded Warriors interviewed at WRAMC

Figure B.1. Decision of Wounded Warriors interviewed at WRAMC.

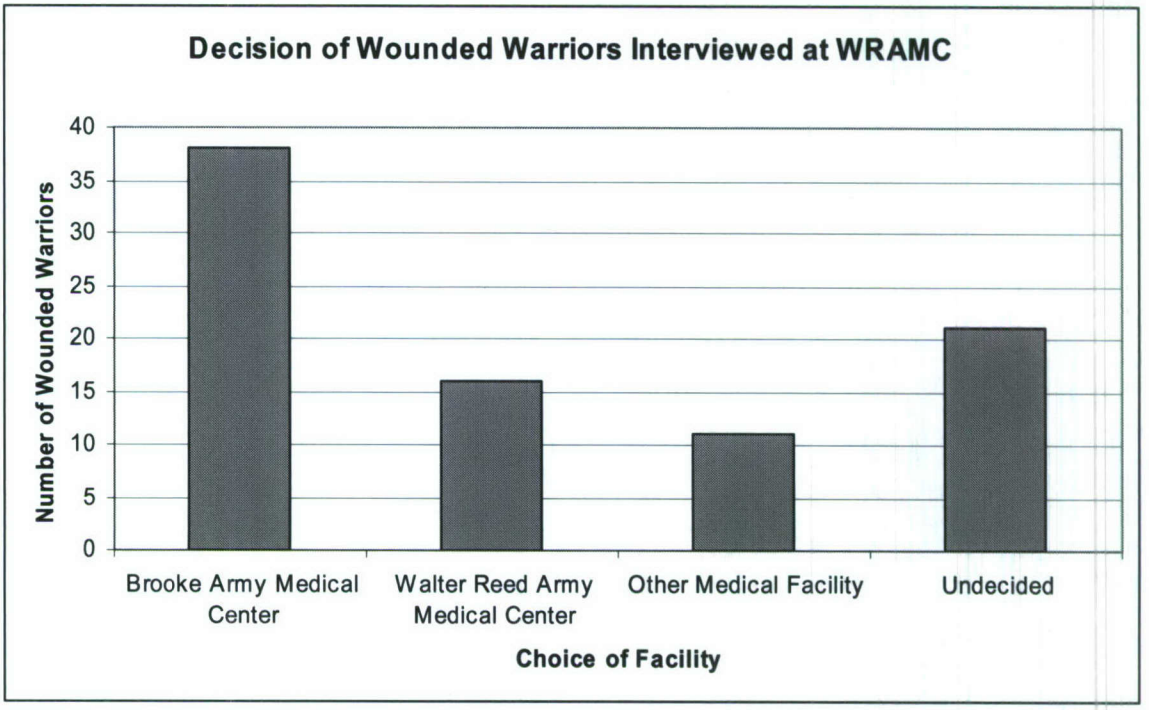


Table B.1. Decision of Wounded Warriors interviewed at WRAMC.

Table B.1. Decision of Wounded Warriors Interviewed at WRAMC

Wounded Warrior Care Facility	n	Percent
Brooke Army Medical Center	38	44.19%
Walter Reed Army Medical Center	16	18.60%
Other Medical Facility	11	12.79%
Undecided	21	24.42%
Total	86	100.00%

Appendix B

Appendix B.2. Duty Station of Wounded Warriors interviewed at WRAMC.

Figure B.2. Duty Station of Wounded Warriors interviewed at WRAMC.

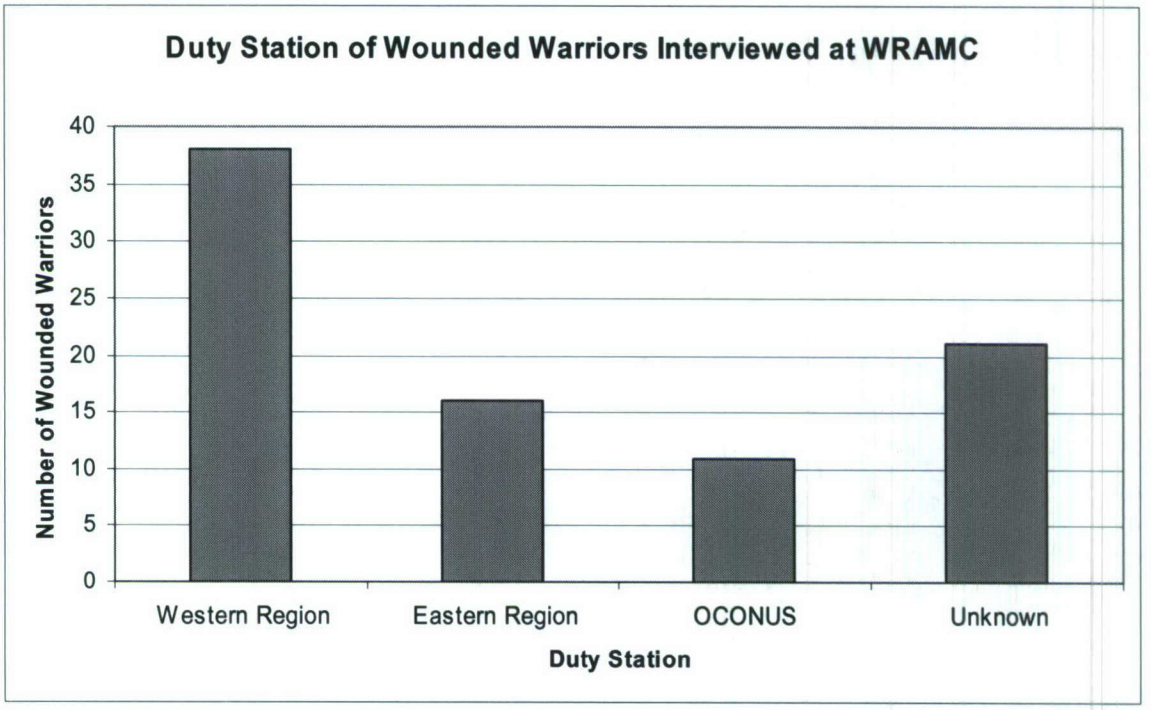


Table B.2. Duty Station of Wounded Warriors interviewed at WRAMC

Table B.2. Duty Station of Wounded Warriors Interviewed at WRAMC

Duty Station	n	Percent
Western Region	38	44.19%
Eastern Region	16	18.60%
OCONUS	11	12.79%
Unknown	21	24.42%
Total	86	100.00%

Appendix B

Appendix B.3. Home of Record of Wounded Warriors interviewed at WRAMC

Figure B.3. Home of Record of Wounded Warriors interviewed at WRAMC.

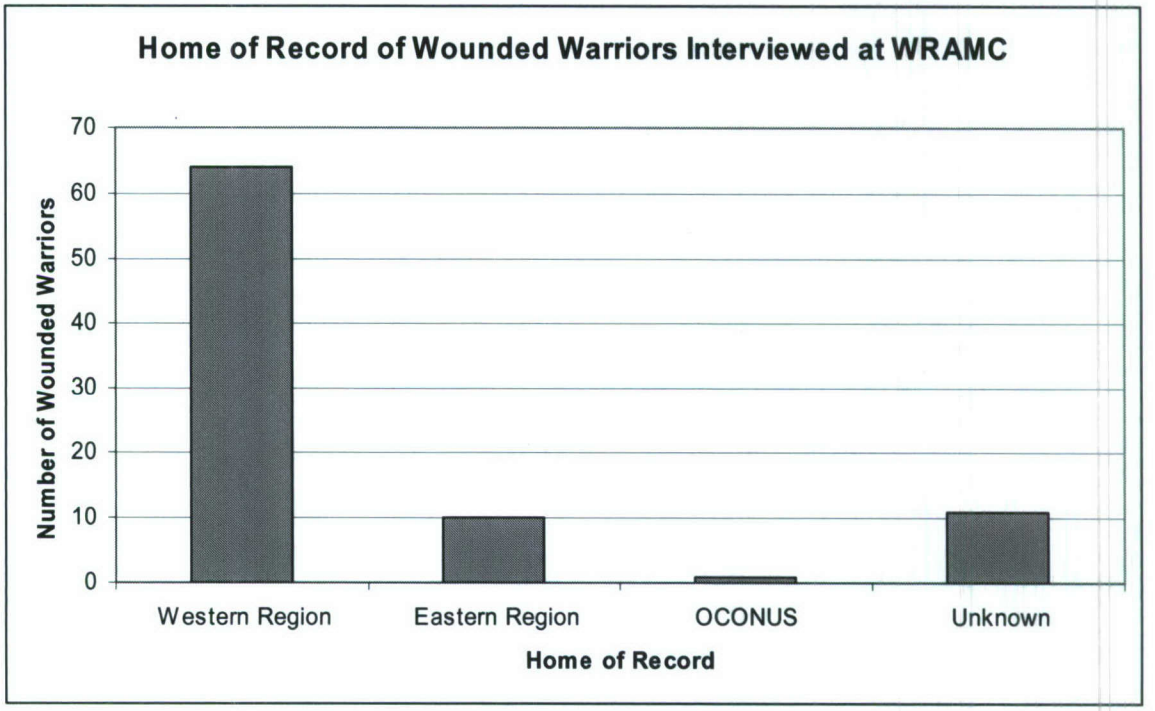


Table B.3. Home of Record of Wounded Warriors interviewed at WRAMC

Table Home of Record of Wounded Warriors Interviewed at WRAMC.

Wounded Warrior Care Facility	n	Percent
Western Region	64	74.42%
Eastern Region	10	11.63%
OCONUS	1	1.16%
Unknown	11	12.79%
Total	86	100.00%

Appendix B

Appendix B.4. Reason for Decision of Wounded Warriors interviewed at WRAMC

Figure B.4. Reason for Decision of Wounded Warriors interviewed at WRAMC.

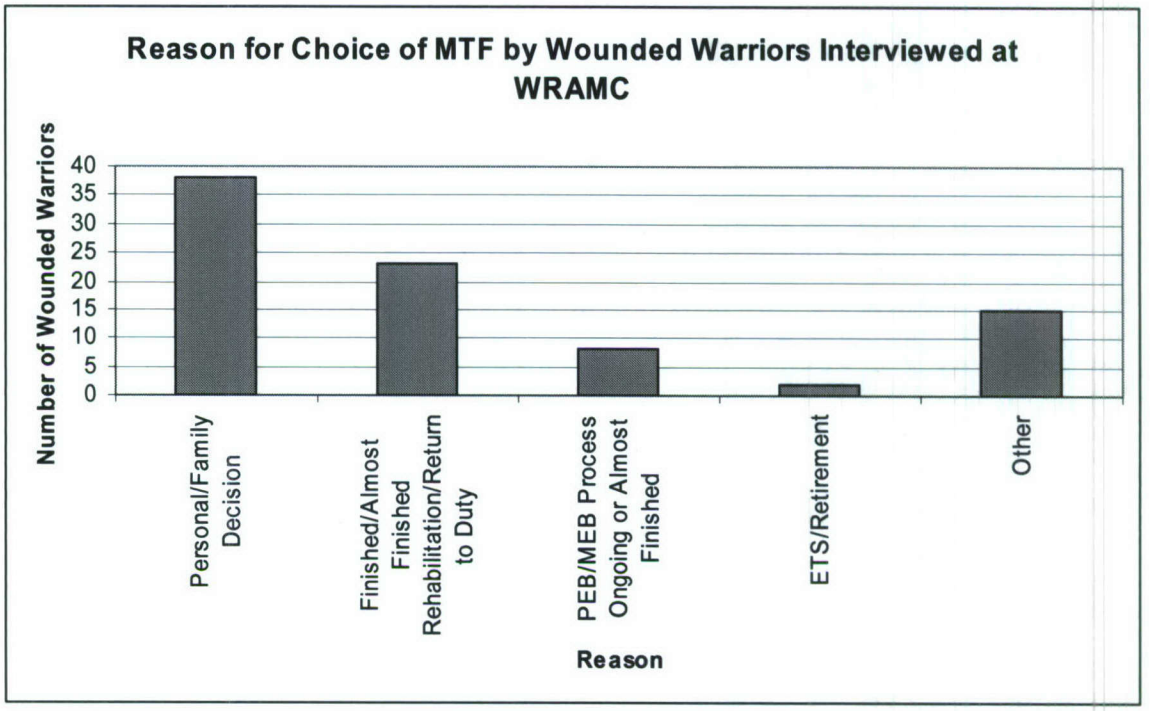


Table B.4. Reason for Decision of Wounded Warriors interviewed at WRAMC

Table B.4. Reason for Choice of MTF by Wounded Warriors Interviewed at WRAMC.

Reason	n	Percent
Personal/Family Decision	38	44.19%
Finished/Almost Finished Rehabilitation/Return to Duty	23	26.74%
PEB/MEB Process Ongoing or Almost Finished	8	9.30%
ETS/Retirement	2	2.33%
Other	15	17.44%
Total	86	100.00%

Appendix B

Appendix B.5. Diagnosis of Wounded Warriors interviewed at WRAMC

Figure B.5. Diagnosis of Wounded Warriors interviewed at WRAMC.

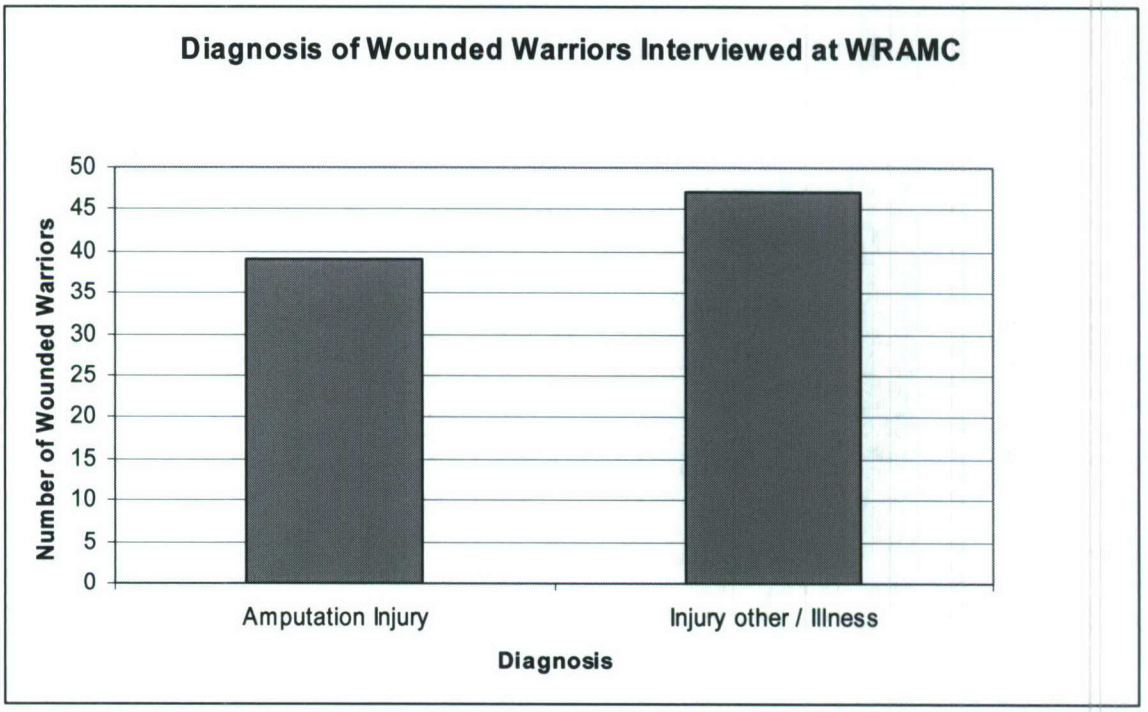


Table B.5. Diagnosis of Wounded Warriors interviewed at WRAMC

Table B.5. Diagnosis of Wounded Warriors Interviewed at WRAMC.

Diagnosis	n	Percent
Amputation Injury	39	43.35%
Injury other / Illness	47	54.65%
Total	86	100.00%

Appendix C

Figures and Tables for the Amputee Care Program database (C.1 through C.11)

Appendix C.1. Care Facility Factor

Figure C.1. Care Facility Factor for ACP Database.

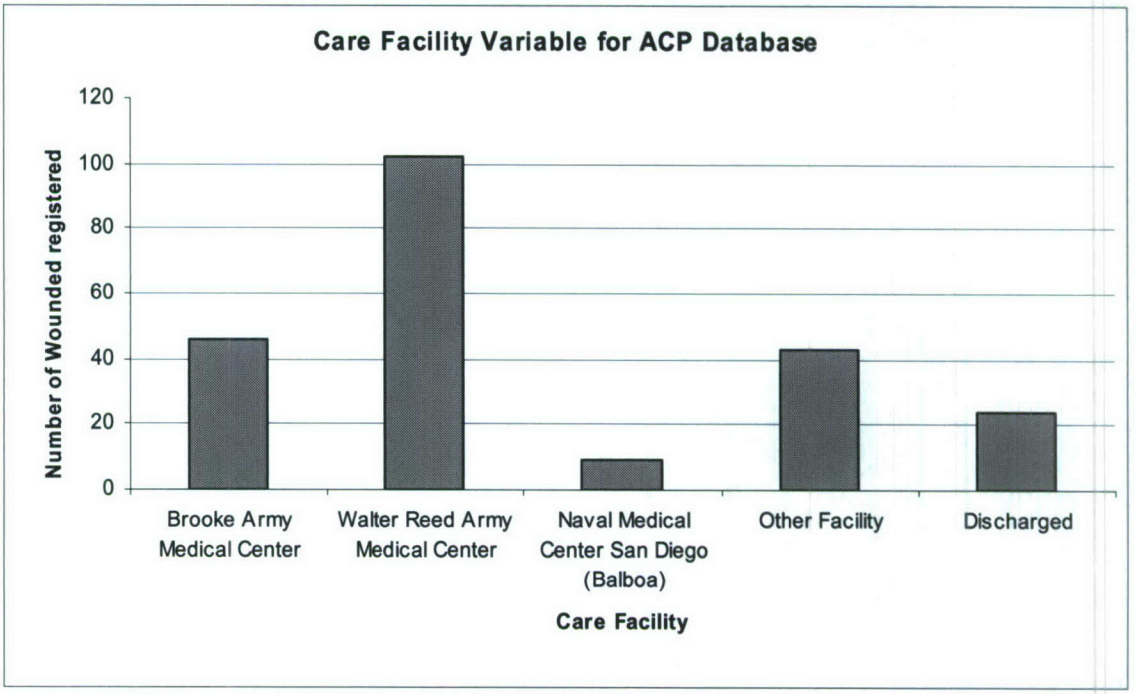


Table C.1. Care Facility Factor for ACP Database.

Table C.1. Care Facility Factor for ACP Database.

Wounded Warrior Care Facility	n	Percent
Brooke Army Medical Center	46	20.5%
Walter Reed Army Medical Center	102	45.5%
Naval Medical Center San Diego (Balboa)	9	4.0%
Other Facility	43	19.3%
Discharged	24	10.7%
Total	224	100.0%

Appendix C

Appendix C.2. Duty Station Factor

Figure C.2.1. Duty Assignment at Time of Wounding

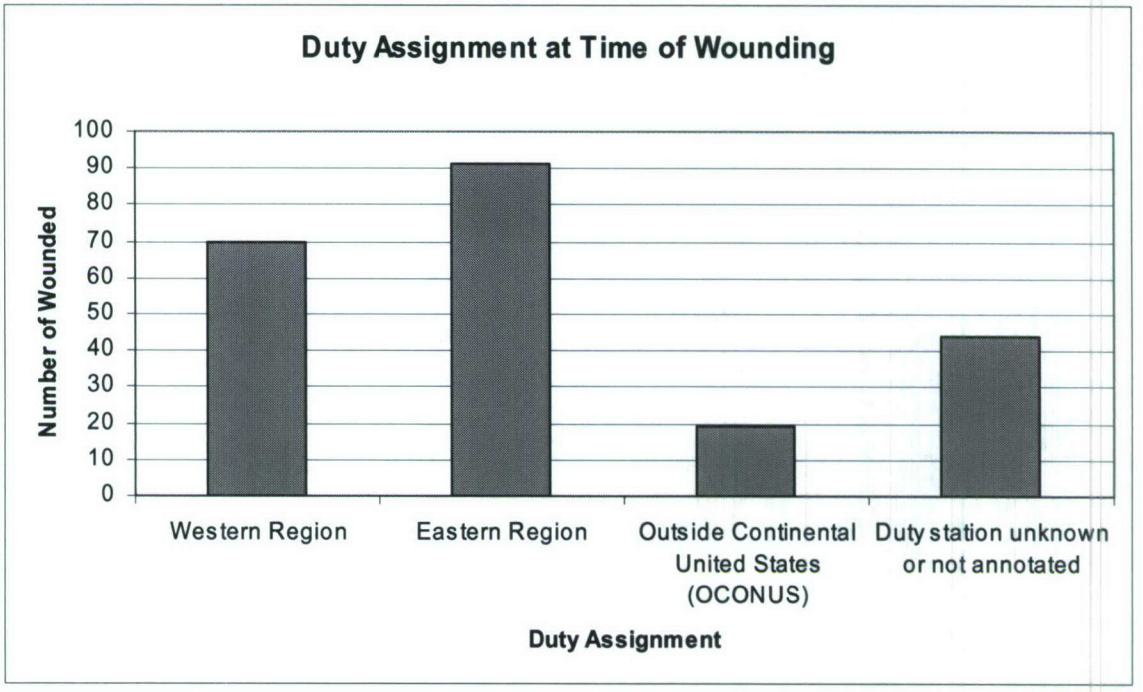


Table C.2. Duty Assignment at Time of Wounding

Table C.2. Duty Assignment at Time of Wounding.

Region of assigned Duty Station	n	Percent
Western Region	70	31.3%
Eastern Region	91	40.6%
Outside Continental United States (OCONUS)	19	8.5%
Duty station unknown or not annotated	44	19.6%
Total	224	100.0%

Appendix C

Appendix C.3. Rank Factor

Figure C.3. Rank Distribution of Wounded Warriors

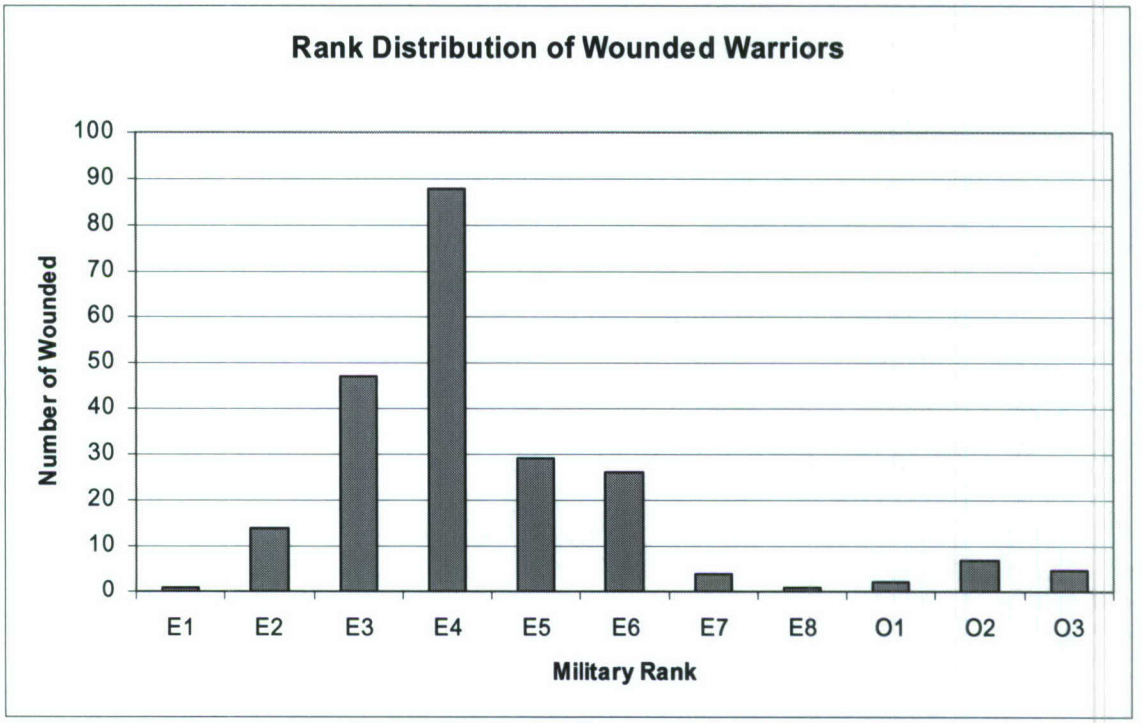


Table C.3.

Table C.3. Ranks of Wounded Warriors in FY2006.

Officer / Enlisted Grade	n	Percent
E1	1	0.4%
E2	14	603.0%
E3	47	21.0%
E4	88	39.3%
E5	29	12.9%
E6	26	11.6%
E7	4	1.8%
E8	1	0.4%
O1	2	0.9%
O2	7	3.1%
O3	5	2.2%
Total	224	100.0%

Note. Officers grade begins with O and Enlisted with E

Appendix C

Appendix C.4. Service Factor

Figure C.4. Military Service of Wounded Warriors

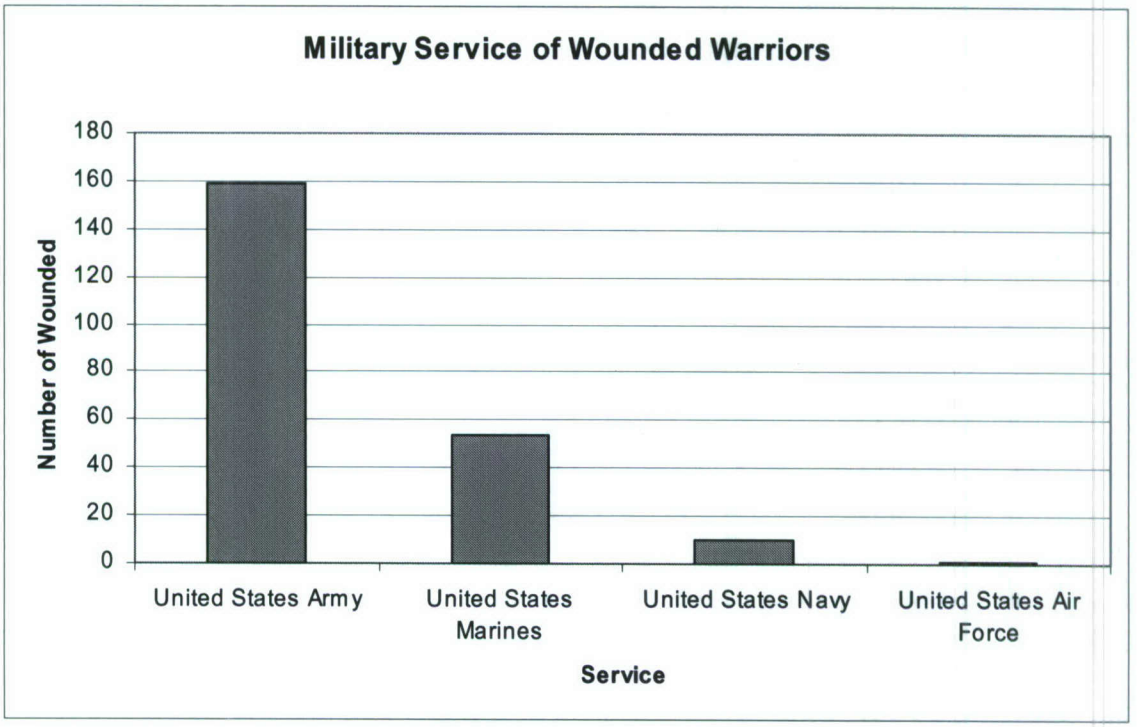


Table C.4.

Table C.4. Military Service of Wounded Warriors.

Military Service	n	Percent
United States Army	159	71.0%
United States Marines	54	24.1%
United States Navy	10	4.5%
United States Air Force	1	0.4%
Total	224	100.0%

Appendix C

Appendix C.5. Age Distribution of ACP Database

Table C.5

Table C.5. Age Distribution of ACP database.

Age	n	Percent
19	11	4.9%
20	28	12.5%
21	31	13.8%
22	33	14.7%
23	15	6.7%
24	18	8.0%
25	18	8.0%
26	15	6.7%
27	6	2.7%
28	4	1.8%
29	10	4.5%
30	5	2.2%
31	5	2.2%
32	3	1.3%
33	4	1.8%
34	1	0.4%
35	2	0.9%
36	4	1.8%
37	2	0.9%
39	2	0.9%
40	1	0.4%
43	1	0.4%
44	1	0.4%
45	1	0.4%
47	1	0.4%
54	2	0.9%
Total	224	100.0%

Appendix C

Appendix C.6. Gender Factor

Figure C.6.1. Gender Distribution of Wounded Warriors in ACP Database.

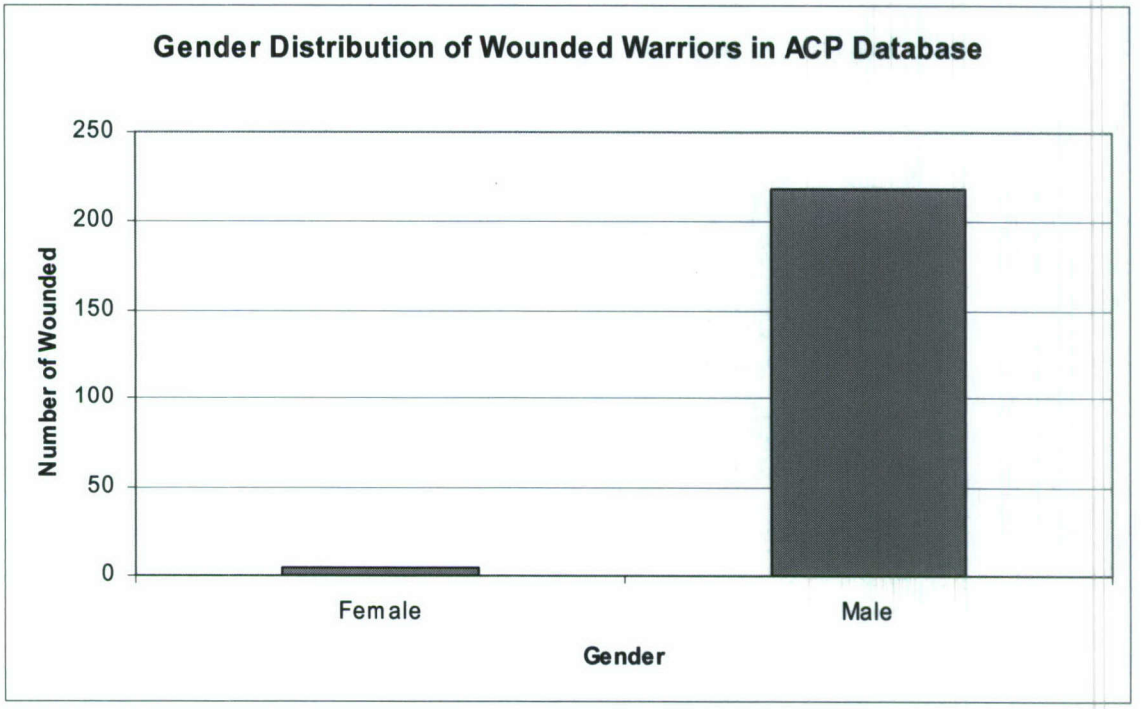


Table C.6. Gender Distribution of Wounded Warriors in ACP database.

Table C.6. Gender Distribution of ACP database.

Wounded Warrior Gender	n	Percent
Female	5	2.2%
Male	219	97.8%
Total	224	100.0%

Appendix C

Appendix C.7. Event Factor

Figure C.7. Operation Distribution of Wounded Warriors in ACP Database.

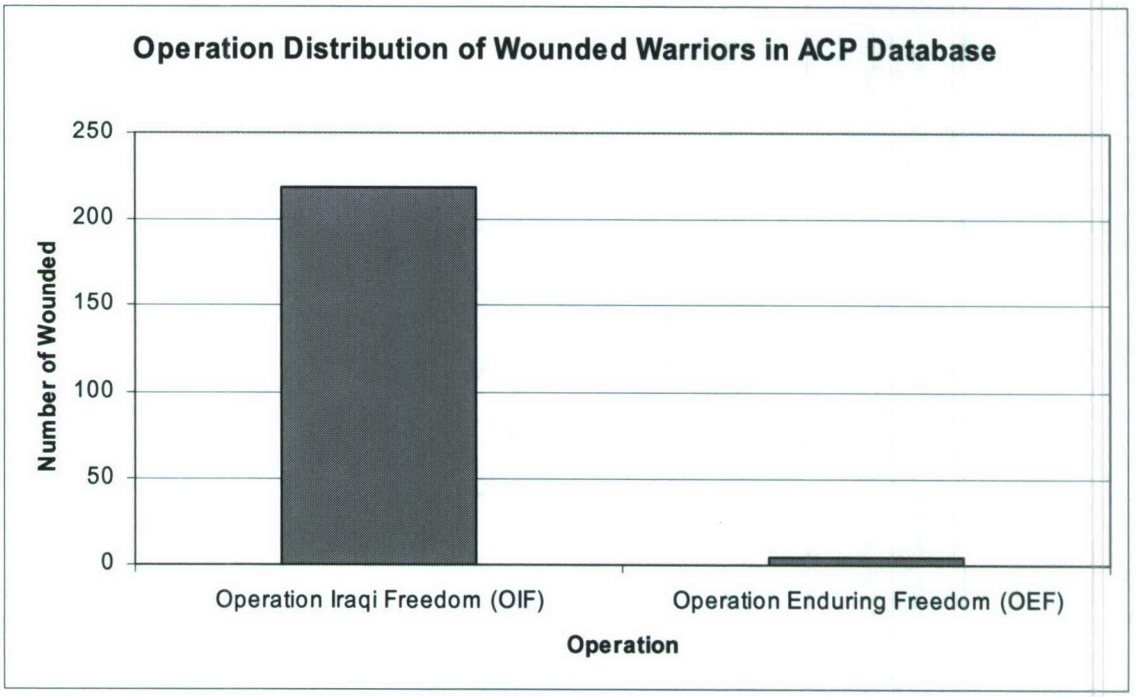


Table C.7. Operation Distribution of ACP database

Table C.7. Operation Distribution of ACP database.

Operation Wounded	n	Percent
Operation Iraqi Freedom (OIF)	219	97.8%
Operation Enduring Freedom (OEF)	5	2.2%
Total	224	100.0%

Appendix C

Appendix C.8. Injury Date

Figure C.8. Month of Wounding in ACP Database.

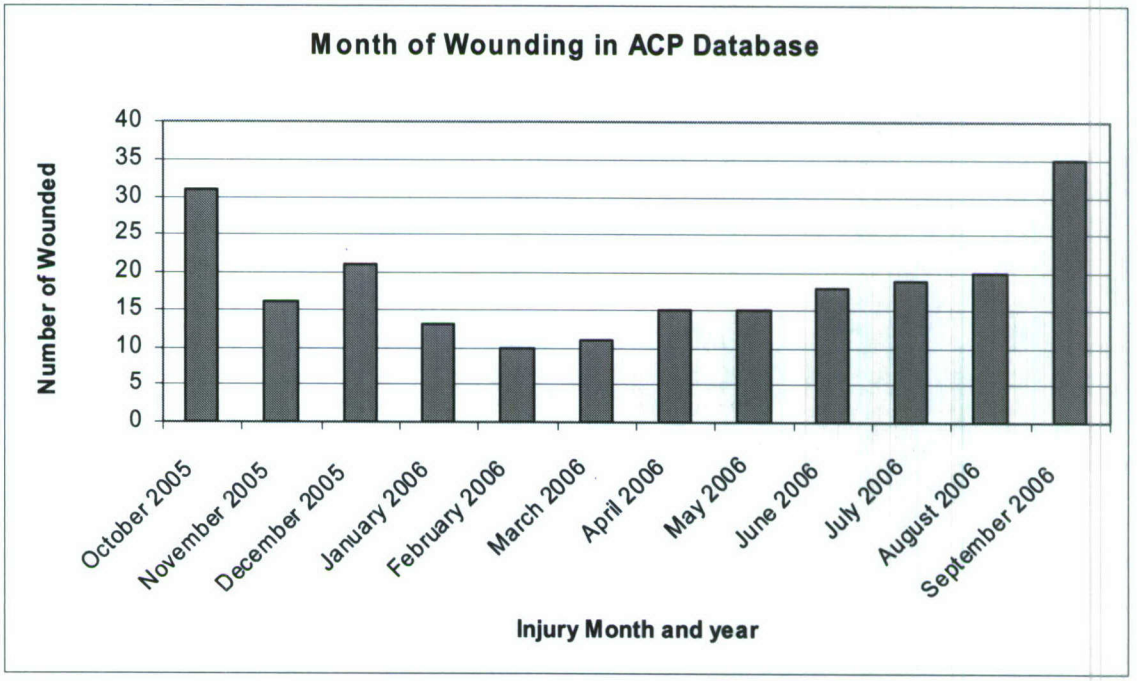


Table C.8. Injury month breakdown for FY2006

Table C.8 Month of Wounding in ACP Database.

Month of Injury	n	Percent
October 2005	31	13.8%
November 2005	16	7.1%
December 2005	21	9.4%
January 2006	13	5.8%
February 2006	10	4.5%
March 2006	11	4.9%
April 2006	15	6.7%
May 2006	15	6.7%
June 2006	18	8.0%
July 2006	19	8.5%
August 2006	20	8.9%
September 2006	35	15.7%
Total	224	100.0%

Appendix C

Appendix C.9. Injury Mechanism

Figure C.9. Mechanism of Injury Distribution in ACP Database.

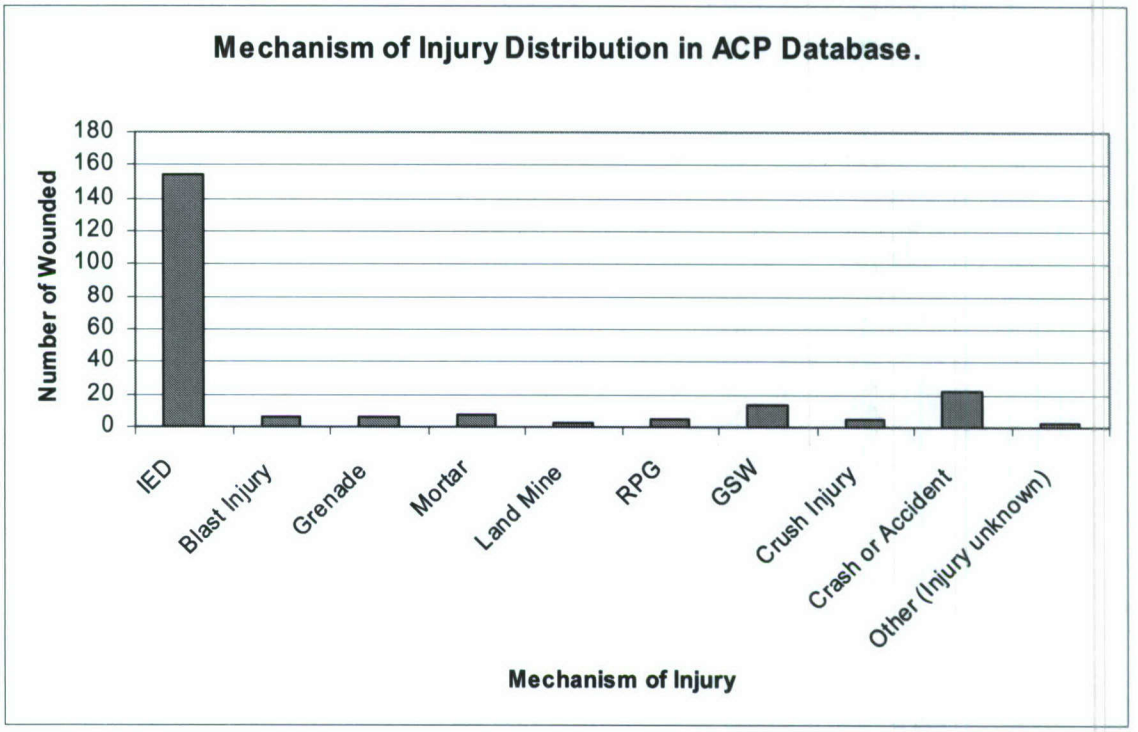


Table C.9. Mechanism of Injury Distribution in ACP Database.

Table C.9. Mechanism of Injury Distribution in ACP Database.

Mechanism of Injury	n	Percent
IED	154	68.8
Blast Injury	6	2.7
Grenade	6	2.7
Mortar	7	3.1
Land Mine	3	1.3
RPG	5	2.2
GSW	14	6.3
Crush Injury	5	2.2
Crash or Accident	22	8.8
Other (Injury unknown)	2	0.9
Total	224	100.0

Appendix C

Appendix C.10. Injury Location

Figure C.10. Injury Location on Wounded Warriors in ACP Database.

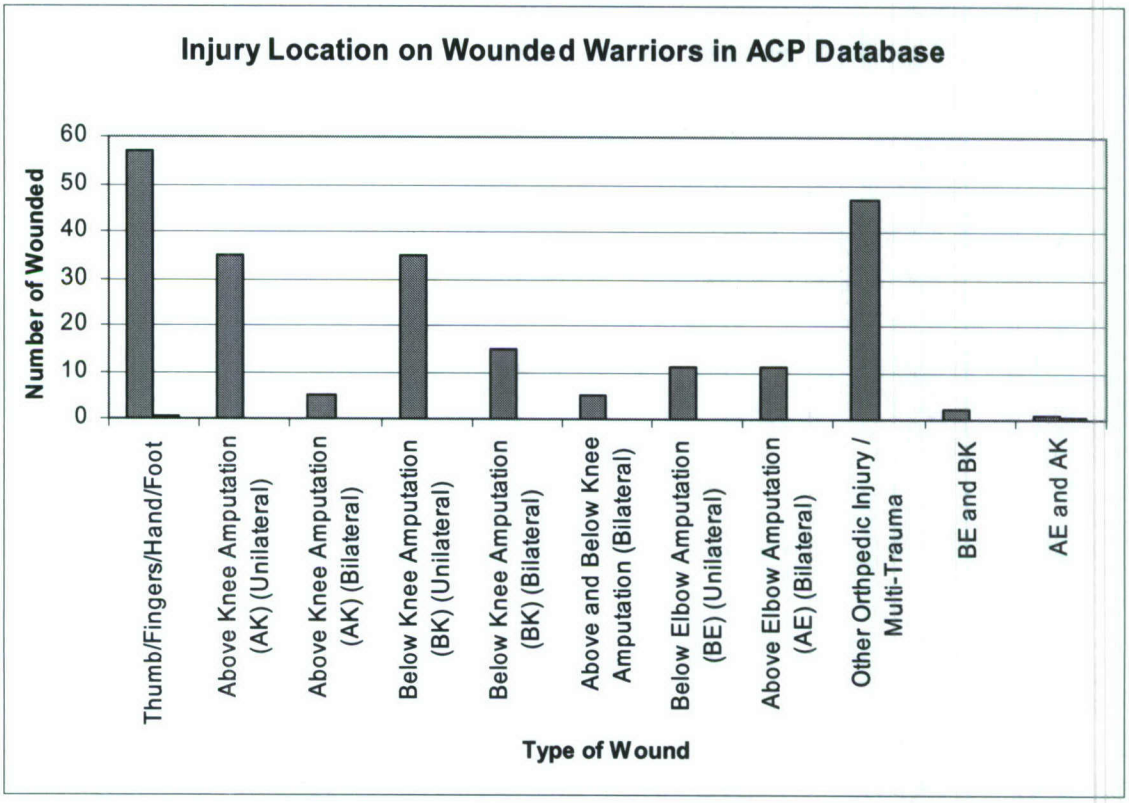


Table C.10. Injury Location on Wounded Warriors in ACP Database.

Table C.10. Injury Location on Wounded Warriors in ACP Database.

Location of Injury	n	Percent
Thumb/Fingers/Hand/Foot	57	25.4%
Above Knee Amputation (AK) (Unilateral)	35	15.6%
Above Knee Amputation (AK) (Bilateral)	5	2.2%
Below Knee Amputation (BK) (Unilateral)	35	15.6%
Below Knee Amputation (BK) (Bilateral)	15	6.7%
Above and Below Knee Amputation (Bilateral)	5	2.2%
Below Elbow Amputation (BE) (Unilateral)	11	4.9%
Above Elbow Amputation (AE) (Bilateral)	11	4.9%
Other Orthpedic Injury / Multi-Trauma	47	21.0%
BE and BK	2	1.0%
AE and AK	1	40.0%
Total	224	100.0%

Appendix C

Appendix C.11. Injury Type

Figure C.11. Injury Received by Wounded Warriors

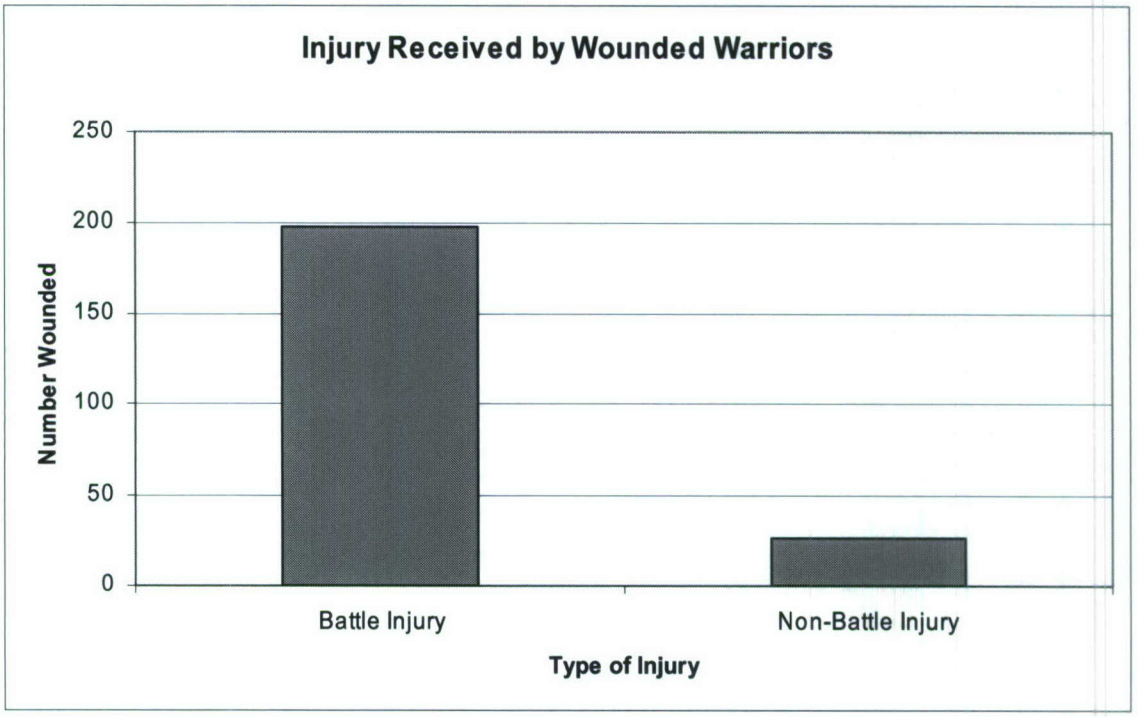


Table C.11. Injury Received by Wounded Warriors

Table C.11. Injury Received by Wounded Warriors.

Injury Type	n	Percent
Battle Injury	198	88.4%
Non-Battle Injury	26	11.6%
Total	224	100.0%

Appendix D

BAMC Joint Patient Tracking Application Figures and Tables (D.1 through D.4)

Appendix D.1. BAMC Patients Received by Month in JPTA

Figure D.1. BAMC Patients Received by Month in JPTA.

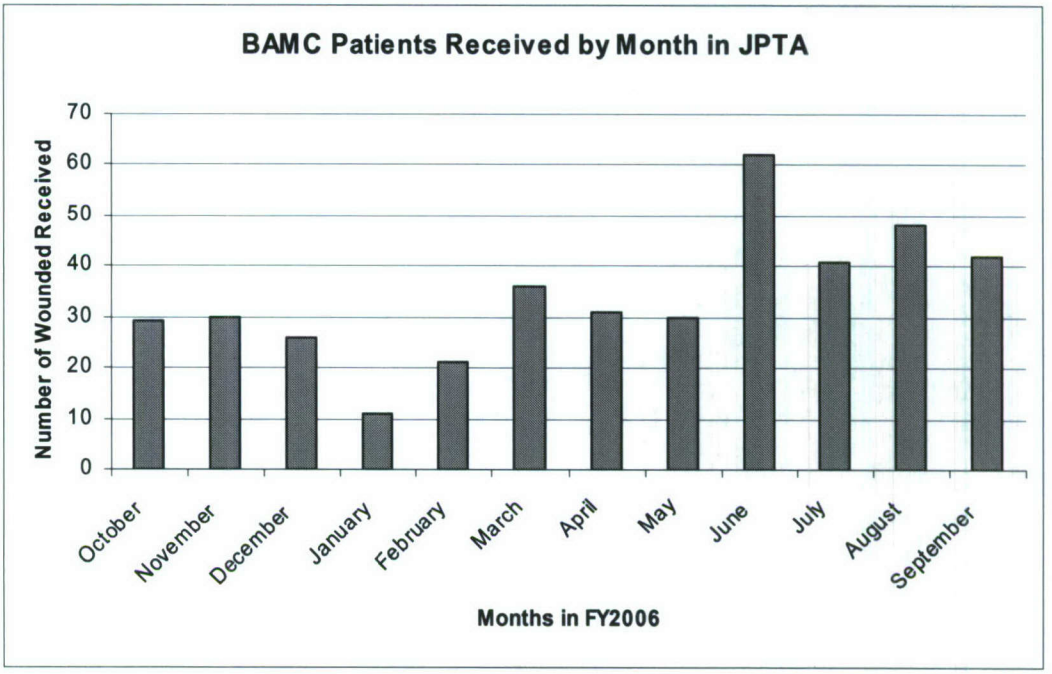


Table D.1. BAMC Patients Received by Month in JPTA.

Table D.1. BAMC Patients Received by Month in JPTA.

Month	n	%
October	29	6.65%
November	30	7.39%
December	26	6.40%
January	11	2.71%
February	21	5.17%
March	36	8.87%
April	31	7.64%
May	30	7.39%
June	62	15.28%
July	41	10.34%
August	48	11.82%
September	42	10.34%
Total	406	100.00%

Appendix D

Appendix D.2. BAMC Patients Received by Injury Nature in JPTA

Figure D.2. BAMC Patients Received by Injury Nature in JPTA.

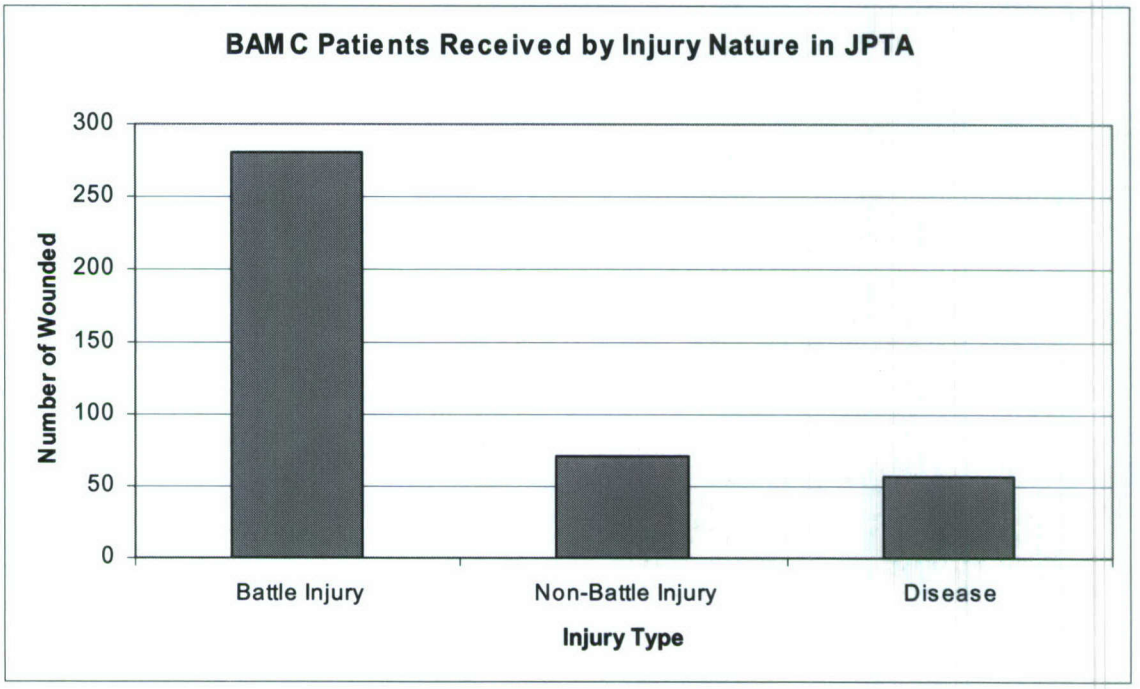


Table D.2. BAMC Patients Received by Injury Nature in JPTA.

Table D.2. BAMC Patients Received by Injury Nature in JPTA.

Injury Type	n	n %
Battle Injury	280	68.97%
Non-Battle Injury	70	17.24%
Disease	56	13.79%
Total	406	100.00%

Appendix D

Appendix D.3. BAMC Patients Received by Operation in JPTA

Figure D.3. BAMC Patients Received by Operation in JPTA.

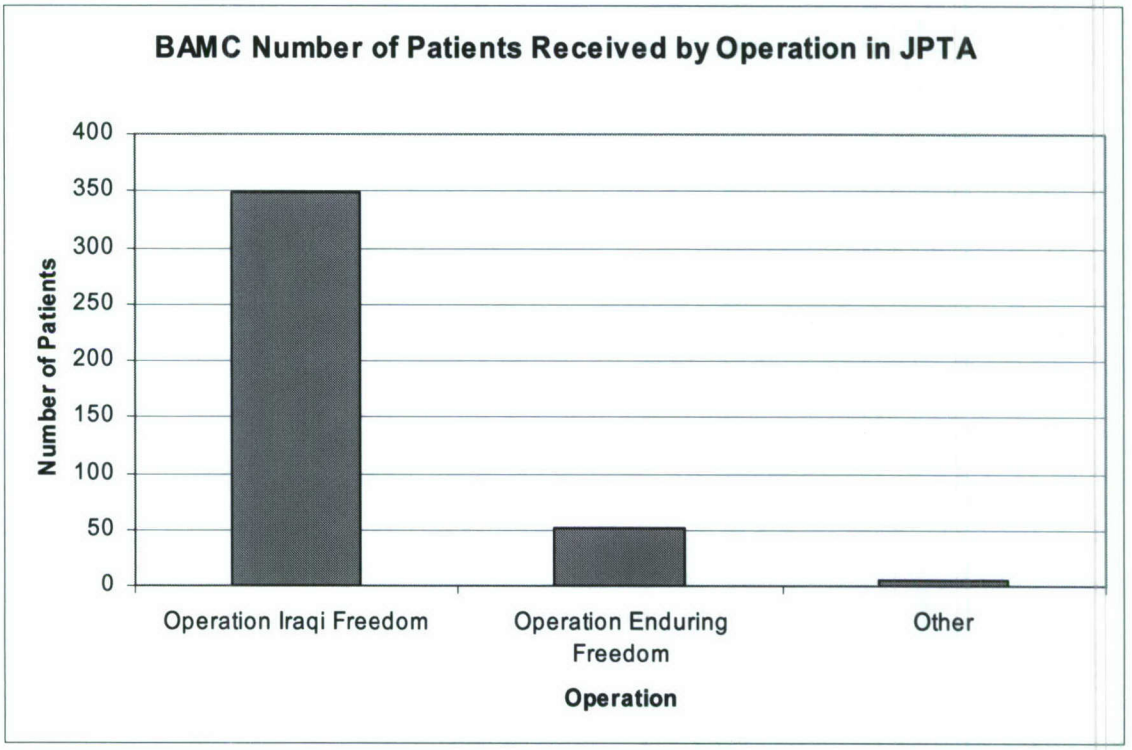


Table D.3. BAMC Patients Received by Operation in JPTA.

Table D.3. BAMC Number of Patients Received by Operation in JPTA.

Operation	n	n %
Operation Iraqi Freedom	348	85.71%
Operation Enduring Freedom	52	12.81%
Other	6	1.48%
Total	406	100.00%

Appendix D

Appendix D.4. BAMC Patients Received by Service in JPTA

Figure D.4. BAMC Patients Received by Service in JPTA.

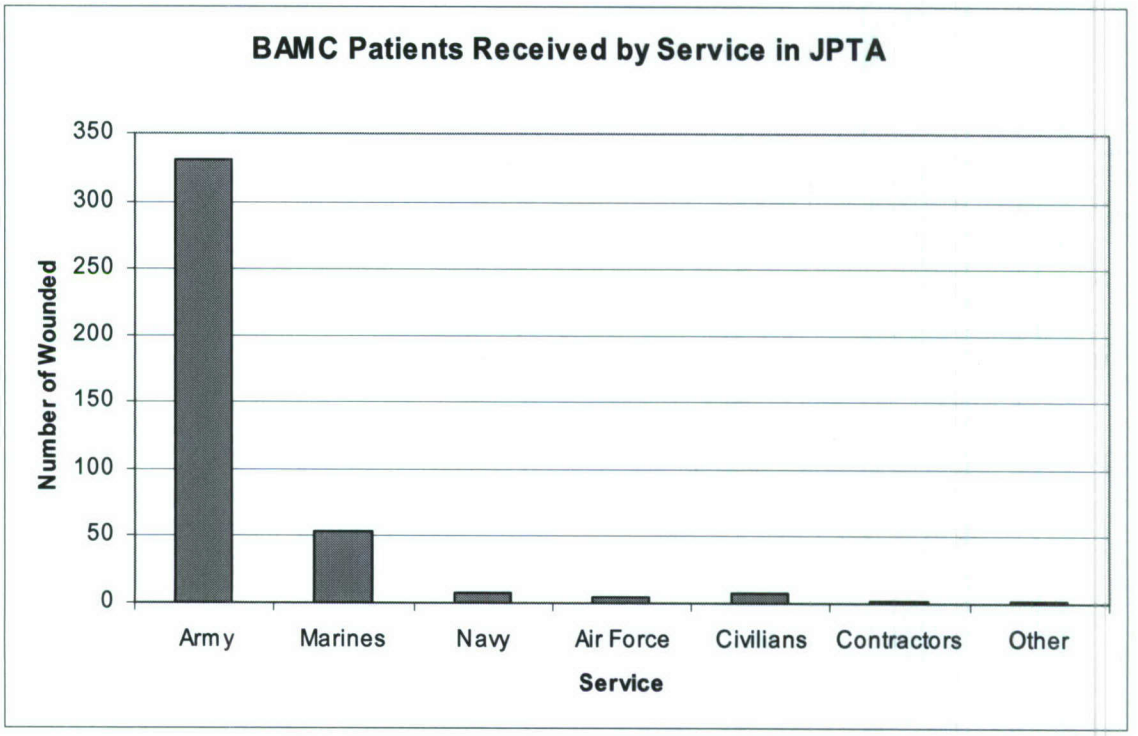


Table D.4. BAMC Patients Received by Service in JPTA.

Table D.4. BAMC Patients Received by Service in JPTA.

Service	n	n %
Army	331	81.53%
Marines	53	13.05%
Navy	7	1.72%
Air Force	5	1.24%
Civilians	7	1.72%
Contractors	2	0.49%
Other	1	0.25%
Total	406	100.00%

Appendix E

WRAMC Joint Patient Tracking Application Figures and Tables (E.1 through E.4)

Appendix E.1. WRAMC Patients Received by Month in JPTA

Figure E.1. WRAMC Patients Received by Month in JPTA.

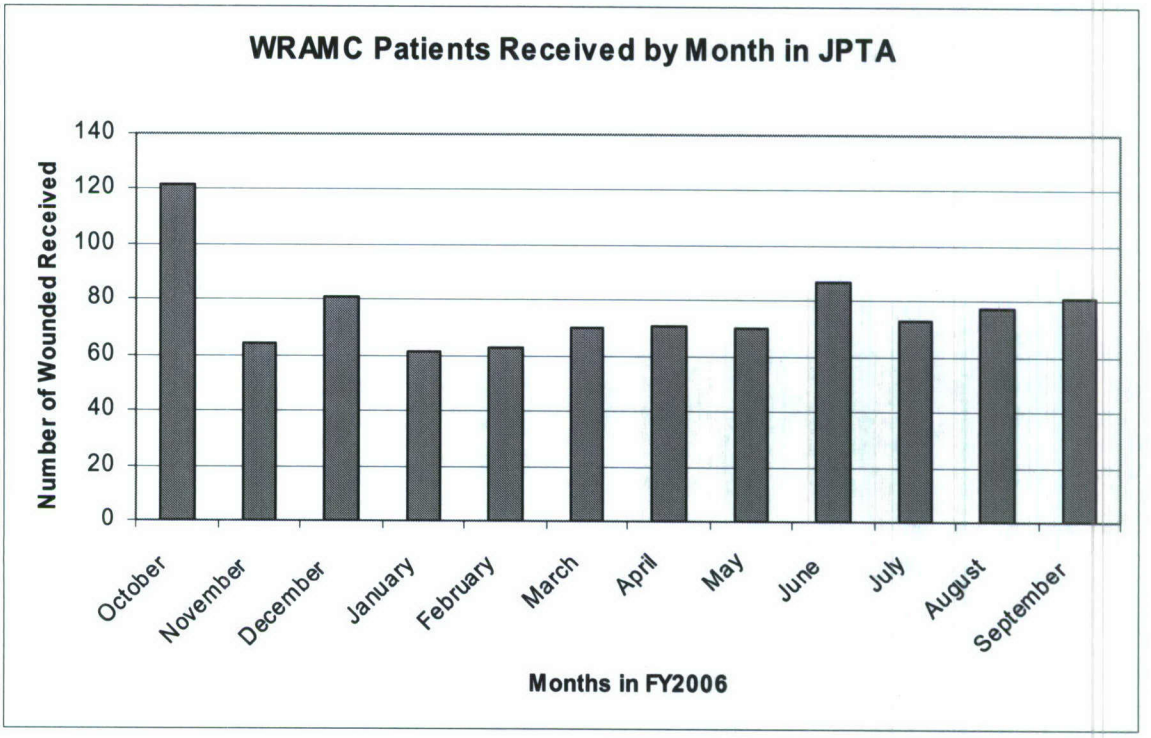


Table E.1. WRAMC Patients Received by Month in JPTA.

Table E.1. WRAMC Patients Received by Month in JPTA.

Month	n	%
October	122	13.26%
November	64	6.96%
December	81	8.80%
January	61	6.63%
February	63	6.85%
March	70	7.61%
April	71	7.72%
May	70	7.61%
June	87	9.46%
July	73	7.93%
August	77	8.37%
September	81	8.80%
Total	920	100.00%

Appendix E

Appendix E.2. WRAMC Patients Received by Injury Nature in JPTA

Figure E.2. WRAMC Patients Received by Injury Nature in JPTA.

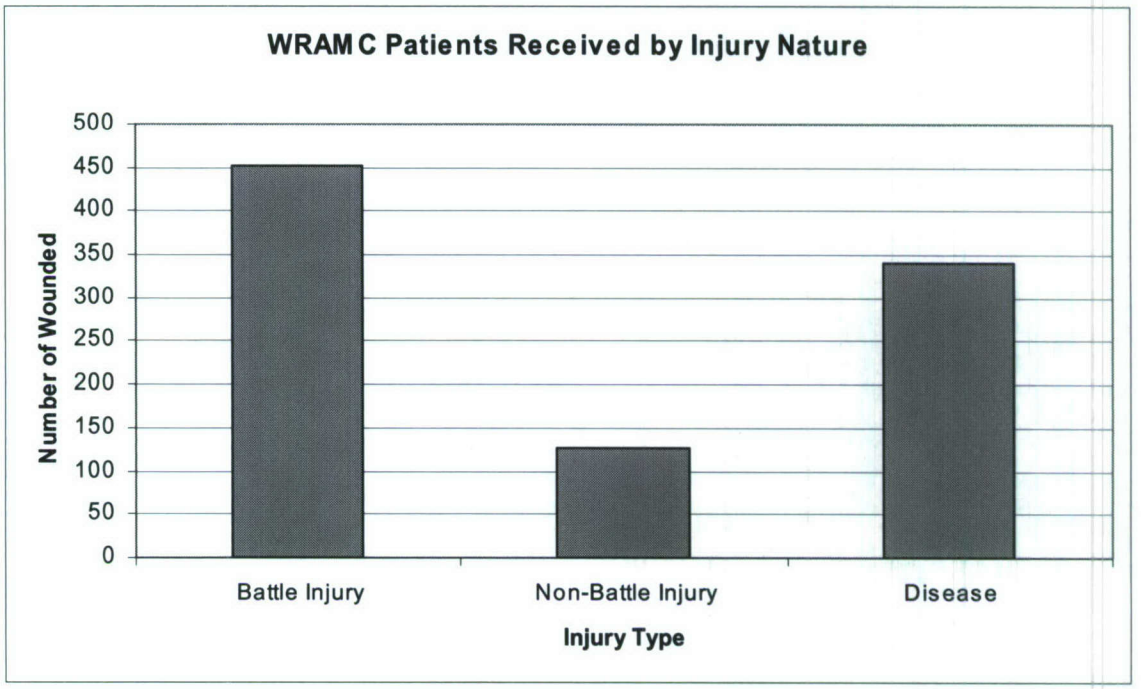


Table E.2. WRAMC Patients Received by Injury Nature in JPTA.

Table E.2. WRAMC Patients Received by Injury Nature.

Injury Type	n	n %
Battle Injury	451	49.02%
Non-Battle Injury	127	13.81%
Disease	342	37.17%
Total	920	100.00%

Appendix E

Appendix E.3. WRAMC Patients Received by Operation in JPTA

Figure E.3. WRAMC Patients Received by Operation in JPTA.

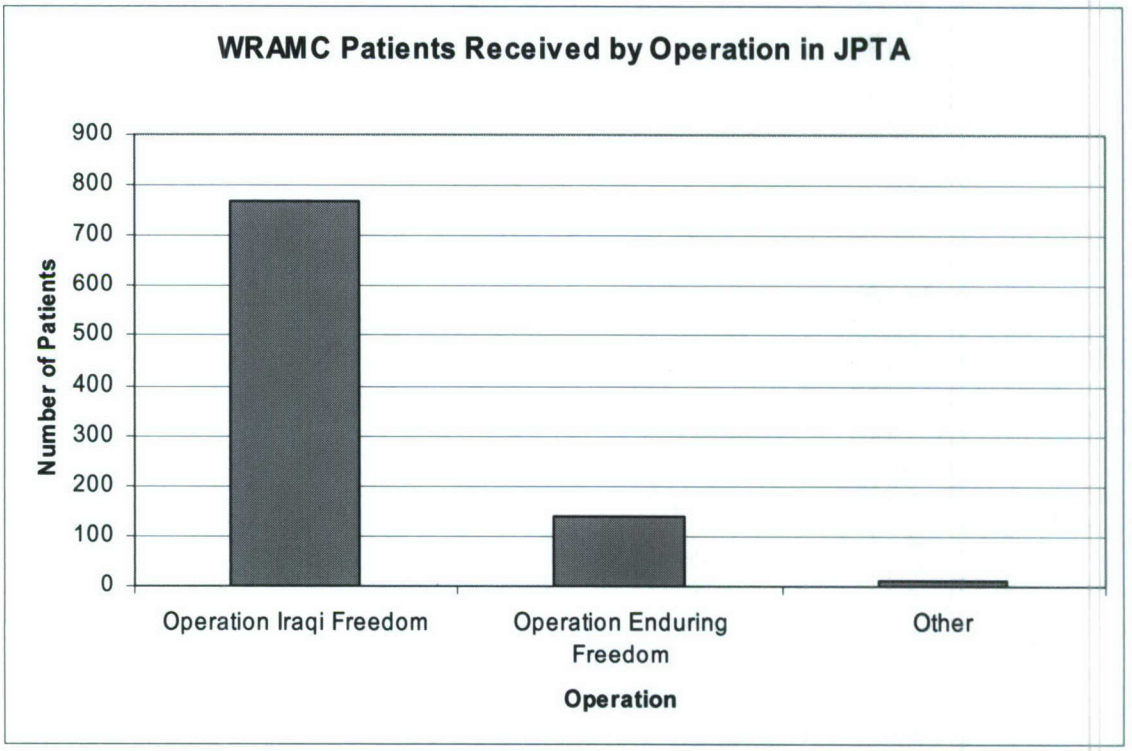


Table E.3. WRAMC Patients Received by Operation in JPTA.

Table E.3. WRAMC Patients Received by Operation in JPTA.

Operation	n	n %
Operation Iraqi Freedom	767	83.37%
Operation Enduring Freedom	141	15.33%
Other	12	1.30%
Total	920	100.00%

Appendix E

Appendix E.4. WRAMC Patients Received by Service in JPTA

Figure E.4. WRAMC Patients Received by Service in JPTA.

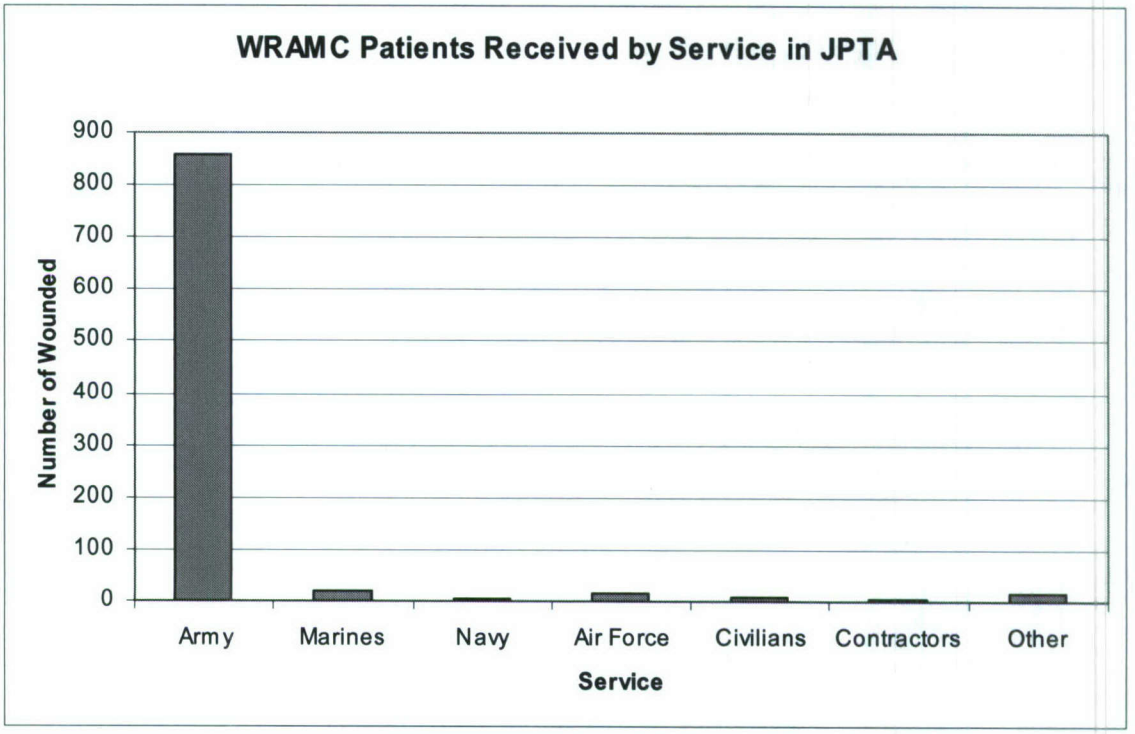


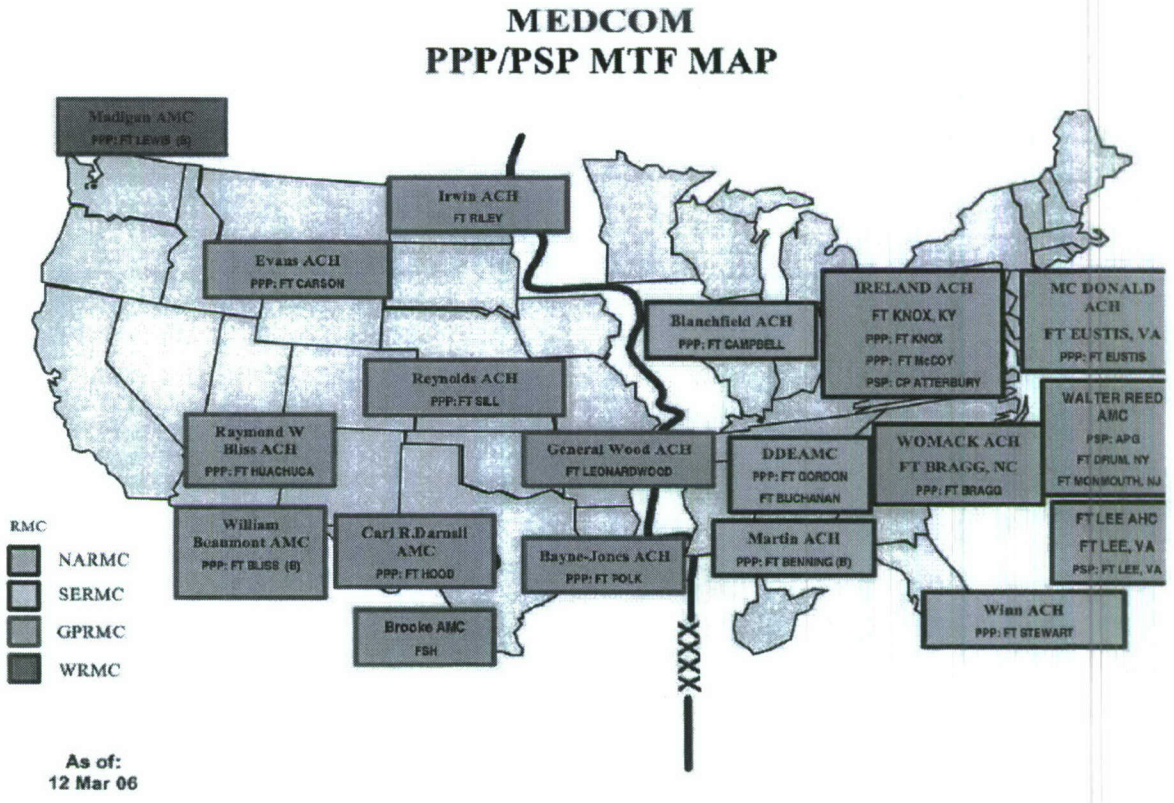
Table E.4. BAMC Patients Received by Service in JPTA.

Table E.4. WRAMC Patients Received by Service in JPTA.

Service	n	n %
Army	856	93.04%
Marines	20	2.17%
Navy	5	1.64%
Air Force	15	0.54%
Civilians	7	0.76%
Contractors	2	0.21%
Other	15	1.64%
Total	920	100.00%

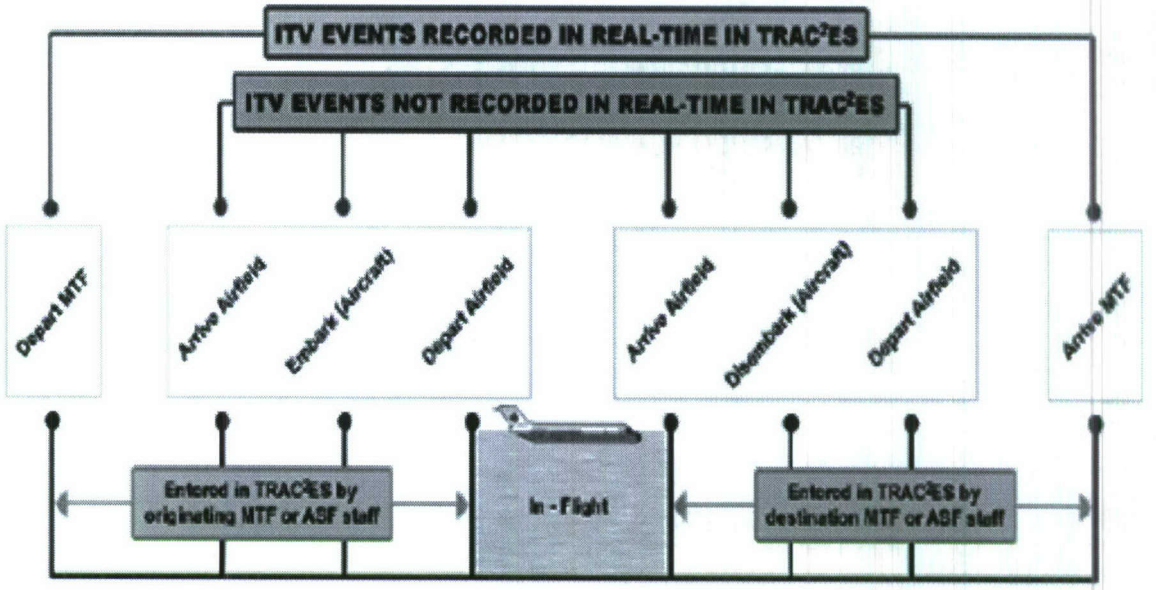
Appendix F

Figure F.1. MEDCOM Region Map (From OTSG/MEDCOM Policy Memo 06-022.



Appendix G

Figure G.1 In-Transit Visibility in TRAC2ES.



Source: TRAC2ES Handbook, 2005 Edition.

Appendix H

Table H.1 List of DoD Policies, Directives, Instructions, Memorandums and Messages for Patient Regulation

- DoD Instruction 6000.11, "Medical Regulating," 9 Sep 98
- DoD Directive 6000.12, "Health Services Operations and Readiness," 20 Jan 98
- DoD Directive 4500.9, "Transportation and Traffic Management," January 26, 1989
- DoD Directive 5154.6, Armed Services Medical Regulating, 12 Jan 05
- DoD Directive 5158.4, "United States Transportation Command," January 8, 1993
- DoD Directive 4500.43, "Operational Support Airlift (OSA)," October 28, 1996
- DoD 4515.13-R, "Air Transportation Eligibility," November 1994, authorized by DoD Directive 4500.9, January 26, 1989
- Army Regulation 40-350 Patient Regulating to and Within the Continental United States, 30 March 1990
- AR 40-400, Patient Administration, 12 Mar 01
- Message, HQ, USCENTCOM, CCSG Surgeon, 271942Z Oct 03, subject USCENTCOM Guidance on Through Regulation of Patients Outside of Area of Responsibility (AOR)
- ALARCT Message, 191146Z Apr 03, subject: OIF/OEF Injured Tracking and Unit Notification.
- MEDCOM Regulation 40-21, Regional Medical Commands and Regional Dental Commands, 22 Oct 99.
- Memorandum of Understanding between the Department of Defense and the Veterans Administration, "Referral of Active Duty Patients to Veterans Administration Medical Facilities," June 10, 1986
- Sections 1535 and 1536 of title 31, United States Code, "The Economy Act"
- Veterans Administration-Department of Defense Contingency Planning (National Plan), May 1983
- Joint Federal Travel Regulations, Volume 1, "Uniformed Services Members," current edition
- Joint Travel Regulations, Volume 2, "Department of Defense Civilian Personnel," current edition
- Title 32, Code of Federal Regulations, Part 220